

691.4

H72m

**Hollow  
Building  
Tile  
Manual**  
*for*  
**Builders  
and Masons**

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691.4  
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## Construction Suggestions

Cement Stucco should not be applied in freezing weather.

Window frames of a size that will fit in without cutting the tile units should be used whenever possible.

Partly completed walls should be covered at night, particularly during bad weather, to protect the newly completed work against damage from rain, snow and frost.

Wood frames will shrink away from the masonry and therefore caulking while not necessary, is often advisable around doors and windows, particularly in exposed windy locations.

Hollow Tile should not be dumped from trucks or wagons. Each size or shape should be piled separately. Breakage will be avoided and a saving effected in the mason's time.

Tile should be so built in the wall that all open ends of the cells are sealed up to preserve the insulating value of the air spaces.

The large units in which Hollow Tile are made not only affords the simplest type of permanent construction, but permits of rapid building progress and considerable saving in both labor and mortar. Tile should be thoroughly dampened when laid in dry weather.

Stucco cannot crack or come off a hollow tile wall once it has been properly applied. There is a genuine bond between these materials and any attempt to separate them will demonstrate this, as the line of cleavage will not fail in the joint between the two materials.

In laying up vertical cell tile the masons or bricklayers should be instructed to butter the vertical joint surfaces of tile about  $2\frac{1}{2}$  to 3" in from the inner and outer faces leaving the center free of mortar, so that when laid in the wall through vertical mortar joints will be avoided as far as possible. This gives better insulation and pre-

vents the passage of moisture by capillary attraction.

While in the majority of Hollow Tile residences the stucco and inside plastering is applied directly to the tile wall, it is recommended, especially in northern parts of the country, that the tile be furred and lathed on the inside. This adds to the insulation and overcomes any possible faulty construction causing dampness.

The proper use of Hollow Building Tile is not at all difficult, if a few simple rules are understood. The method of bonding the walls at corners and around door and window openings and the maintaining of a proper break-joint bond throughout the wall, are easily mastered by anyone who can handle a trowel.

Hollow building tile as a backing for stucco is ideal; it does not shrink nor swell, has a low absorption value, will not disintegrate, and has a surface that is both sufficiently rough and dense to insure the best bond between the two materials, and it further is scored with dovetail grooves that provide the strongest possible mechanical bond.

Estimating the quantity of tile required for a given building may be done roughly. It is only necessary to figure the square foot area of work to be done and multiply result by number of tile required to lay one square foot, adding for the area of lintels, copings and for other special work. In ordering the tile, however, the quantities of the several shapes required should be carefully figured and clearly specified. In figuring quantities, all openings in walls over 4 square feet may be deducted.

The method of finishing walls should be settled before window frames are ordered. Stock window frames of the

sizes best adapted to fit the Hollow Tile units with the least amount of cutting and fitting should be used. All window frames for use in walls finished with stucco should have either the

regular staff beads or a staff moulding to finish up against the stucco. Staff bead should be full depth of outside casing where recessed jamb tile are not used.

## Things to Avoid

Don't forget to form drips under lintels and sills, also under belt courses or other projections.

Don't use arch lintels on wide openings and don't support arches on slender piers which do not provide the required abutment.

Don't permit your mason to break up a lot of tile for short pieces. It takes time and wastes material. Smaller shapes and the required quantity of fractional lengths should be specified when ordering the tile.

Don't run rafters for outside porch roofs through the tile wall; it is much simpler to bolt or anchor a bearer to face of wall and nail the joist or rafter to such a bearer. Every hole tends to weaken the wall and also throws out the regular bonding.

All horizontal flat surfaces should be avoided in stucco work. Belt courses should be formed with a good wash.

Don't cut holes in the tile wall for the support of joist; it is much simpler and infinitely better construction to properly build in pockets for joist.

Don't carry the stucco down to grade if it can be avoided; have a grade course of solid material at least 4" thick, brick, stone or good concrete.

Don't permit haphazard back filling around tile foundations, as you do not want pockets for the accumulation of surface water next to your foundation, and you will probably want to do some planting around the building when finished. Careful back filling with good earth is always advisable.

## Tools and Appliances Required

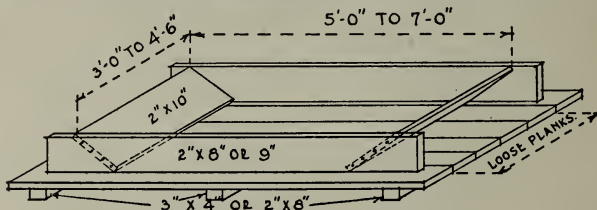


Fig. 920-D Mortar Mixing Box

Mortar is sometimes mixed on the ground, but this is very unsatisfactory and wasteful. A mortar mixing box should be made. Planks that are to be used in some part of the building can be temporarily utilized for this purpose. A good type of mortar box is shown in Figure 920-D. Three pieces

of plank about 5'-0" in length are laid on the ground as a foundation and on these are laid a platform of 2" x 8", 9" or 10" plank about 5'-0" wide and 10'-0" or more in length. Only the two outside planks are nailed to the foundation to prevent spreading. The sides of the box are then formed of 2"

plank, nailed together to form a box 3'-0" to 4'-6" in width and 5'-0" to 7'-0" in length, according to quantity of

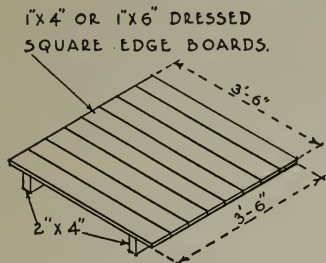


Fig. 920-A Mortar Board

mortar mixed in a batch. For a small job, with only one or two masons working, the smaller size will be the most convenient and for a larger job the standard 4'-0" x 6'-6" box is best.

Mortar boards should be provided, one for each mason with one or two extra, so that helpers can have the

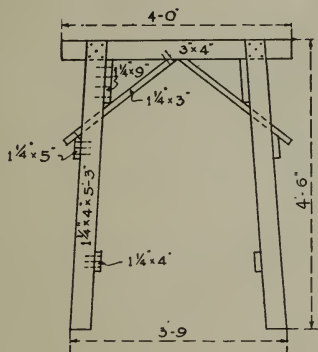


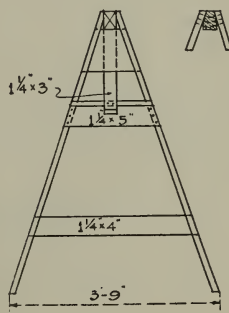
Fig. 1113 Trestle.

boards set up and stocked with mortar ready for the masons when they move from one section of the wall to another. These mortar boards should be 3'-6" square as shown by Figure 920-A, made of 1" x 4" dressed square edge (not matched) boards on 2" x 4" battens.

One or more water barrels should also be provided.

Mortar may be handled from the mixing platform to the work in wheelbarrows and be placed on mortar boards with a shovel the same as on large work, but as this means building runways for the wheelbarrows, it is more frequently handled, on small work particularly, in pails or buckets, as the amount of mortar required is small compared with other forms of masonry. A heavy galvanized iron or light weight wooden stable bucket should be used. The ordinary household pail of wood or iron is not sufficiently strong.

The scaffolding required is made of any 2" plank, 6", 8" or 10" in width, that may be available, placed on trestles. Several pair of trestles should be made as shown in Figure 1113. The number required being determined by the number of masons employed rather than by the size of the job. Trestles 4'-6" in height are



recommended in preference to the 5'-0" trestle, which is generally used for brickwork, on account of the heavier tile units which make the work above chin height somewhat difficult. Also the 4'-6" trestle more evenly divides the average story height.



Some additional planking for runways and a ladder will also be required.

One or more wheelbarrows for handling tile should be on hand.

A mortar hoe and a couple of standard square point shovels complete the equipment, except where a mortar wheelbarrow must be used to handle the mortar.

In addition to this equipment the following mason's tools will be required when the work is undertaken by anyone not having a brickmason's kit.

Brickmason's level.

Plumb line and pegs.

Mason's broad brick chisel.

Brickmason's hammer.

Chipped chisel or brick set.

Long pointed bricklayer's trowel with blade at least  $10\frac{1}{2}$ " long.

In the laying of Hollow Building Tile walls it is an advantage to have the masons work in pairs unless a handy man or helper can be constantly on hand so that it is not necessary for a mason to walk the full length of scaffold each time he wishes to raise the plumb line.

When a straight edge is required it should be made as shown by Figure 920-C. A straight edge will be necessary if cement floors are to be laid and is advisable for the leveling up of forms for concrete foundations, footings and similar work.

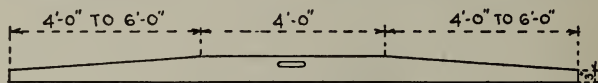


Fig. 920-C Straight Edge.

# Method of Estimating Quantities of Tile Required

Take the length of each outside wall in feet and multiply by the height in feet which will give the superficial area in square feet, and then deduct for all window and door openings which are over 4 square feet in size. This will give the net area of each wall which, added together, will give the total net area of wall surface required.

## Deductions for Windows and Doors

	Sq. Ft.
2 doors	3'-0" x 7'-0" 42
1 window	6'-0" x 5'-0" 30
1 window	5'-0" x 5'-0" 25
3 windows	4'-0" x 5'-0" 60
2 gable windows	3'-0" x 3'-0" 18
	<hr/> 175

Total net area in sq. ft. 1,897

Now, 1,897 sq. ft. equals the total net area or superficial feet of all walls.

In order to convert this into the number of tile required we first determine the thickness of the wall and the size of tile desired.

Assuming an 8x5x12 tile was to be used in an 8" wall side construction, we would multiply 1,897 by 2.2, which equals 4,173.



Fig. 981

In the illustration shown above, A and B are the same length and C and D are the same length, so we get:

	Sq. Ft.
Walls A and B	2 x 36'-0" x 14'-0" 1,008
Walls C and D	2 x 28'-0" x 14'-0" 784
Gables C and D	2 x 28'-0" x 5'-0" 280
Total	<hr/> 2,072

Also, if a 12 x 12 x 12 tile was to be used in a wall 12" thick end construction, we would multiply 1,897 by 1 which equals 1,897, the number of tile required for tile courses 12" high.

## TABLE SHOWING REQUIRED NUMBER OF TILE IN A SQUARE FOOT OF WALL AREA. ALLOWING FOR AMPLE OVERAGE:

NOTE: For special types referred to on page 10, see special literature of the individual manufacturers.

Sizes of Tile.	3 in.	4 in.	5 in.	6 in.	8 in.	10 in.	12 in.
4x 5x12 Side const.	2.2	3.0	...	...	...	...	(2.2)
8x 5x12 Side const.	...	1.5	...	...	2.2	...	(2.2)
3x12x12 End const.	1.0	...	...	...	...	...	4.0
4x12x12 End const.	...	1.0	...	...	...	...	3.0
6x12x12 End const.	...	...	...	1.0	...	...	2.0
8x12x12 End const.	...	...	...	...	1.0	...	1.5
10x12x12 End const.	...	...	...	...	...	1.0	1.2
12x12x12 End const.	...	...	...	...	...	...	1.0
8x 6¼x12 Side const. (Interlocking)	...	...	...	...	2.2	...	...
8½x10¼x12 Side const. (H-Shaped)	...	...	...	...	1.1	...	...

NOTE: A 12" wall side construction may be built up by bonding 4x5x12 and 8x5x12 tile together.

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The quantity of corners, joist course, sill, lintel and jamb or closure tile, should be figured separately and deducted from the straight wall area.

If the tile units are to be laid on the side, closures and half-closures will be necessary at the jambs of all straight openings unless these are to be closed by filling the ends of the tile with concrete. Where recessed box window frames are used, jamb tile and half-jamb tile will be required.

Some form of tile will be required for bonding the corners in any event and also some form for providing a bearing surface for joists and some form of tile for lintels will be required unless the regular straight wall tile is used by filling with concrete and reinforcing them for lintels.

### LINTELS

In determining the quantity of lintels required for window and door openings, we add together the length of each window and door opening, allowing at least 6" bearing on each side of these window and door openings for the lintel to rest upon.

2 doors	3'-0" wide	8'-0"
1 window	6'-0" wide	7'-0"
1 window	5'-0" wide	6'-0"
3 windows	4'-0" wide	15'-0"
2 windows	3'-0" wide	8'-0"

Total 44'-0"

44' represents the lineal feet of lintel section required.

Figure also the lineal feet of sills from actual openings keeping door and window sills separate where a hollow tile sill is to be used. Frequently, however, the wood sill of window frames is set directly on the tile wall and no other shape provided or required for this purpose excepting where the tile are set on end. A course of tile slab should be used under all frames to cap off and close the cells in the tile, when tile are laid with cells vertical.

### SILLS

Door sills.....	2 x 3	6 lin. ft.
Window sills.....	1 x 6	6 " "
" ".....	1 x 5	5 " "
" ".....	3 x 4	12 " "
Gable window sills...	2 x 3	6 " "
Total		35 lin. ft

35' represents the lineal feet of sill section required.

The vertical lineal feet of jamb for all plain openings is figured for closures and vertical lineal feet of recessed box frame openings for jamb tile.

Where straight wall tile is used for regular lintels, the item for regular lintels is disregarded, otherwise, this item would be deducted at an equivalent area in square feet.

Window and door sills, if included, would be deducted at  $\frac{1}{2}$  square foot each. Area of jambs to be deducted by averaging the jambs and half-jambs to equal  $\frac{3}{4}$  foot per lineal foot. Closures and half-closures would be similarly averaged. Corner tile will be equivalent to  $\frac{2}{3}$  to  $1\frac{1}{2}$  square foot per lineal foot. Joist course is usually taken to equal one square foot per lineal foot.

NOTE: When the corner tile are different from the regular wall tile and are to be deducted, the side and end are to be measured. Fig. 113 on page 24 deduct  $\frac{2}{3}$  sq. ft. Fig. 102 deduct 1.5 sq. ft. Fig. 101 deduct 1.03 sq. ft. Fig. 114 deduct .8 sq. ft. and add one 2 x 8 x 12 tile per lin. ft. of corner.

These items for the house shown on our sketch will be as follows:

Window and door lintels.....	44 lin. ft. = 44
Door sills.....	6 " " = 3
Window sills.....	29 " " = 15
Jamb.....	62 " " = 46
Closures.....	23 " " = 21
Corners (4 x 14).....	56 " " = 56
Joist course (2 x 36).....	72 " " = 72

Total = 257

Thus we will have approximately 257 square feet to deduct if all these items were to be provided for, giving the reduced area of straight wall tile as 1897 minus 257 = 1,640, multiplied by 2.4 = 3,936 pieces.

Now then, our completed quantities will read:

3,936 pcs. of wall tile
44 lin. ft. lintel
6 " " door sills
29 " " window sills
62 " " jambs
23 " " closures
56 " " corners
72 " " joist tile



## Standard Shapes of Tile for Side Construction

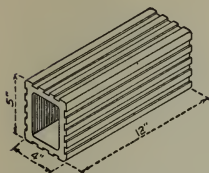


Fig. 877-A  
Weight, 10 lbs.

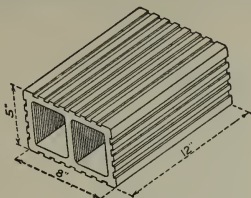


Fig. 877  
Weight, 16 lbs.

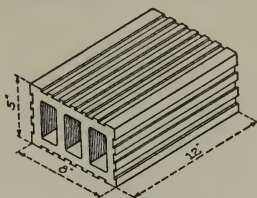


Fig. 1018  
Weight, 18 lbs.

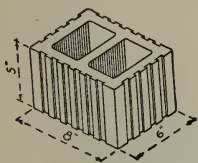


Fig. 948-A  
Half-Closure Tile.

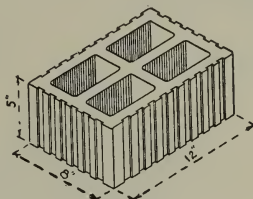


Fig. 948  
Closure Tile.

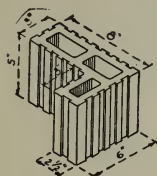


Fig. 949-A  
Half-Jamb Tile.

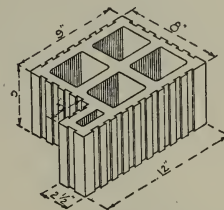


Fig. 949  
Jamb Tile.

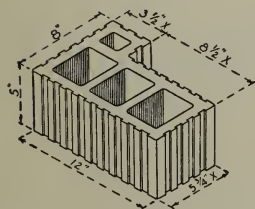


Fig. 950  
Special Corner Tile.

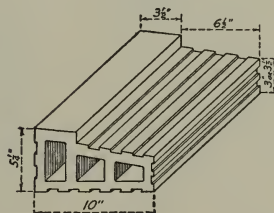


Fig. 906  
Sill Tile for both End and Side Construction.

The weights of the tile given above are approximate, as differences in the density of clays and shales make some difference in the actual weights. These figures allow an ample factor of safety for use in figuring loads and stresses.

# Standard Shapes of Tile for End Construction

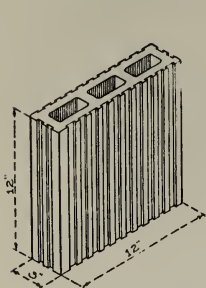


Figure 1019-A  
Weight, 22 lbs.

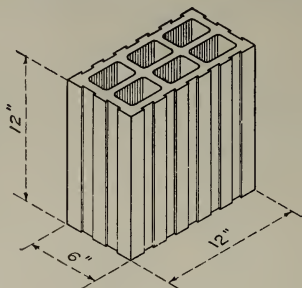


Figure 884-C  
Weight, 30 lbs.

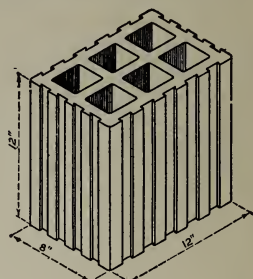


Figure 880  
Weight, 36 lbs.

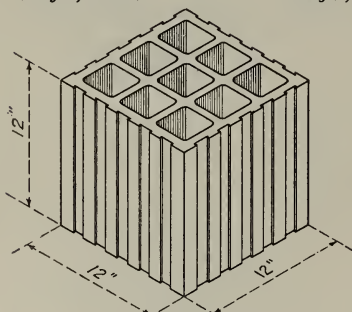


Figure 1023  
Weight, 42 lbs.

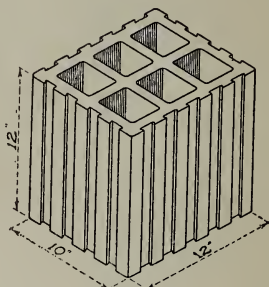


Figure 1021  
Weight, 54 lbs.

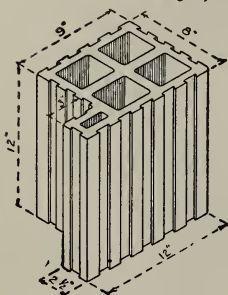


Fig. 938  
Jamb Tile.

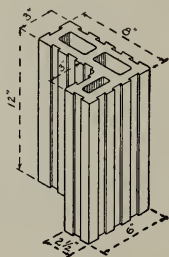


Fig. 939  
Half-Jamb Tile.

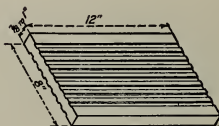
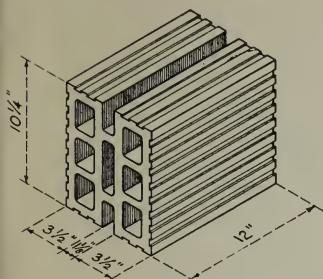


Fig. 928  
1' Slabs. Showing form in which they are usually made. A tap on the corner separates the tile into slabs. Made in required wall widths up to 12'.

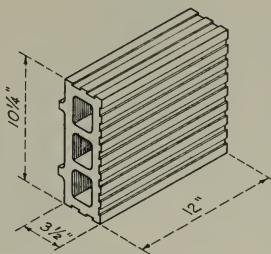
The weights of the tile given above are approximate, as differences in the density of clays and shales make some difference in the actual weights. These figures allow an ample factor of safety for use in figuring loads and stresses.

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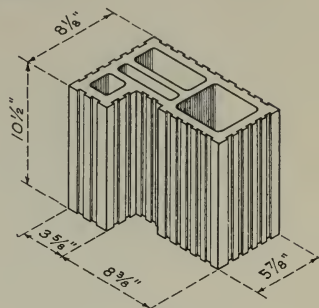
## Standard H-Shaped Tile



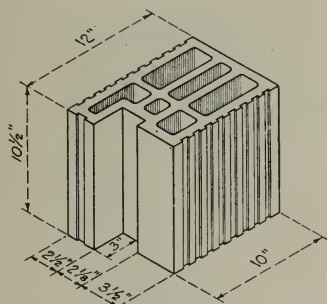
No. 47  
Weight 34 lbs.



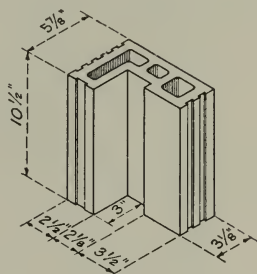
No. 47-F



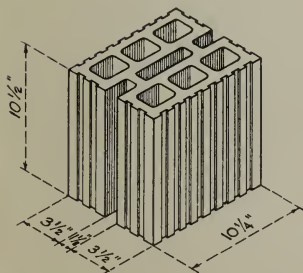
No. 47-C



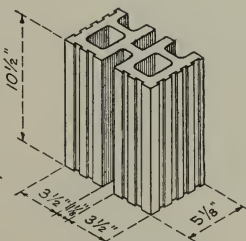
No. 47-J



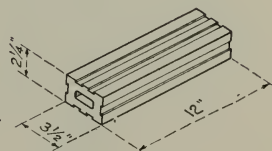
No. 47-J-6



No. 47102



No. 47-J-102

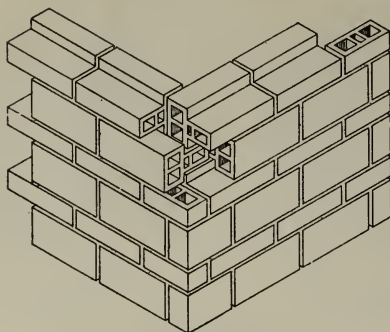


No. 11

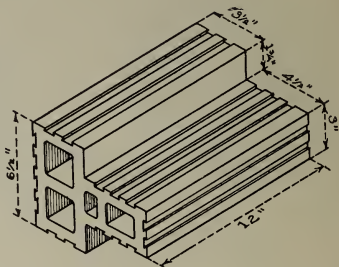
No. 47 is the Standard unit. No. 35 and No. 23 is made similar to No. 47 except the heights, which are  $7\frac{3}{8}$ " and 5" respectively, each with its complement of special shapes such as jambs corners, etc.

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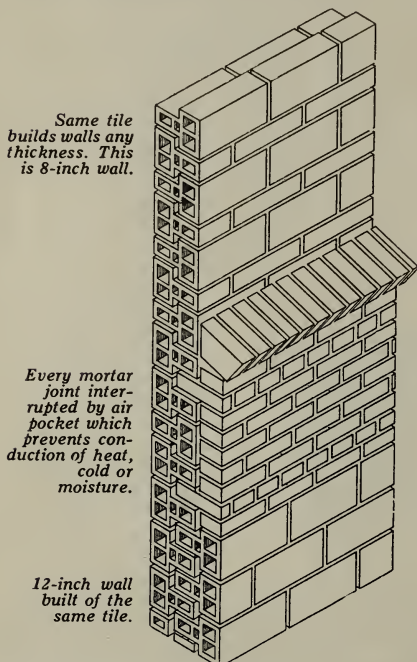
# Standard Interlocking Tile



Corner Construction 8" Walls.  
Note: Corner tile omitted in upper part of wall to show bonding.



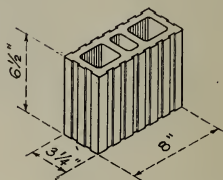
Interlocking Tile—Figure 1569



Same tile builds walls any thickness. This is 8-inch wall.

Every mortar joint interrupted by air pocket which prevents conduction of heat, cold or moisture.

12-inch wall built of the same tile.



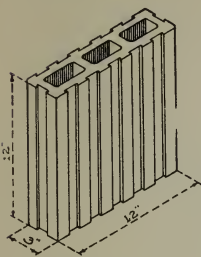
Corner Tile—Figure 1569-C

Faced with Brick

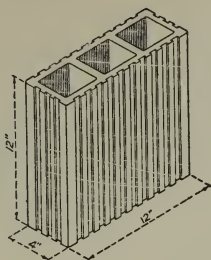
Tile left exposed

A full complement of interlocking shapes such as starters, jambs, etc., are furnished by all manufacturers of this shape.

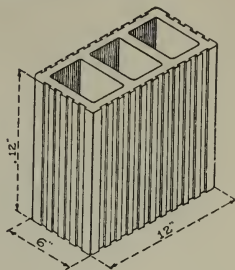
## Standard Shapes of Partition or Floor Tile



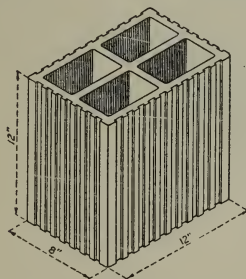
*Fig. 1019-C*  
Weight, 16 lbs.



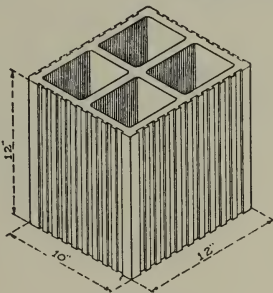
*Fig. 1022-A*  
Weight, 18 lbs.



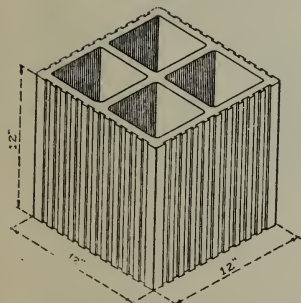
*Fig. 1019-D*  
Weight, 22 lbs.



*Fig. 1020*  
Weight, 30 lbs.



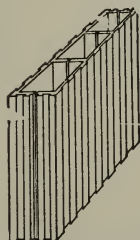
*Fig. 1019-E*  
Weight, 36 lbs.



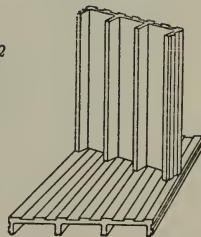
*Fig. 1019-F*  
Weight, 40 lbs.

The following special sizes can be furnished by some manufacturers:  
5x12x12, 3 cell, weight 20 lbs.  
7x12x12, 3 cell, weight 25 lbs.  
9x12x12, 4 cell, weight 33 lbs.

## Split Furring Tile



$1\frac{1}{2} \times 12 \times 12$   
Weight,  
8 lbs.



$2 \times 12 \times 12$   
Weight,  
9 lbs.

*Before Separation*

*After Separation*

The weights of the tile given above are approximate, as differences in the density of clays and shales make some difference in the actual weights. These figures allow an ample factor of safety for use in figuring loads and stresses.



## Hollow Building Blocks

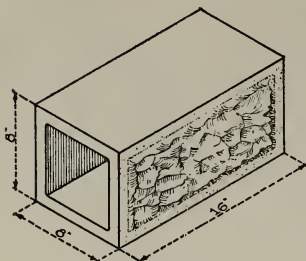


Fig. 1017-A

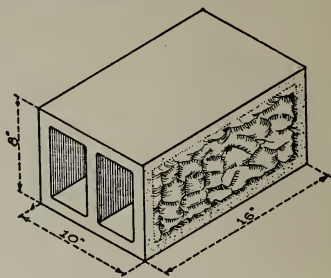


Fig. 1017-B

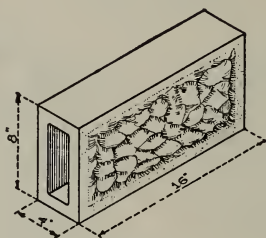


Fig. 1017

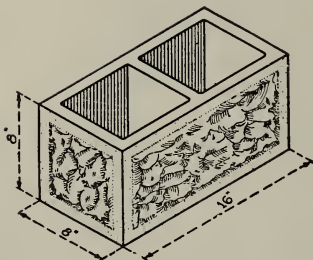


Fig. 1087  
Corner Block.

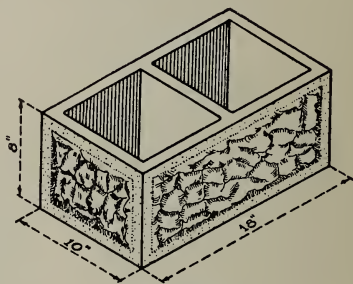


Fig. 1087-A  
Corner Block.

## Hollow Building Tile Shapes

The preceding pages show only the standard shapes of tile.

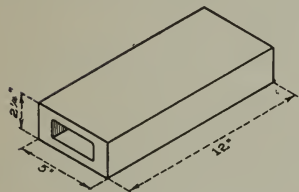
There are other types of Hollow Tile than those illustrated in this Manual.

Each type has its proper complement of special shapes, such as corners and jambs,

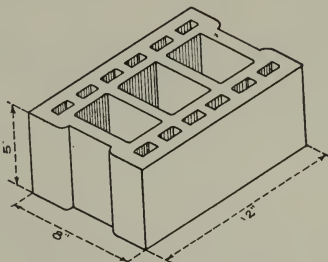
The particular advantages claimed by the manufacturers of these special types of tile will be found in their individual literature.

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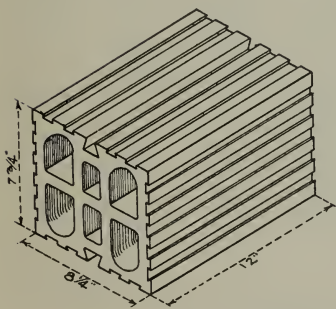
## Special Shapes of Hollow Building Tile



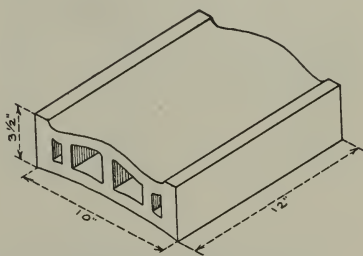
*Roman Tile—Figure 1573*



*Double Shell Tile—Figure 1570*



*Heavy Duty Tile—Figure 1571*



*Cord-tex Tile—Figure 1572*

The preceding pages show only the standard shapes of hollow building tile. The Shapes shown above are special and each type has its proper complement of shapes such as corners, jambs and starters.

Particular advantages claimed of these special types will be found in the literature of the various individual manufacturers, the names of whom will be gladly furnished by the Association.

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*The Hollow Building Tile Association, Conway Building, Chicago*

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## Cement Mortar

Hollow Building Tile should be set with cement mortar composed by measure of one part Portland cement to not more than three parts clean sharp sand, to which may be added lime paste or hydrated lime not exceeding 15% by measure of the cement.

Note:—The percentage of lime added is always figured on the quantity of the cement used, therefore 15 per cent is equal to about one-sixth part by measure of the cement.

The lime specified is not needed to make the mortar stronger, but to make

it more plastic and easier to handle. Mortar containing lime will adhere better to the tile, makes a neater job and results in a saving in labor. Too much lime must not be used as it weakens the mortar. A straight lime mortar, however rich the mixture, is not suitable for setting Hollow Tile.

A sand containing a quantity of loam must not be used for cement plastering or stucco.

Sand containing a little clay may be used if the grains are not coated.

### TABLE OF QUANTITIES FOR CEMENT MORTAR *Materials required to lay up 1000 pieces of Hollow Tile*

Table gives quantities of mortar materials required to lay up 1000 pieces of Hollow Tile (pieces not square feet) of the various sizes given. This table allows about 10 per cent for waste and is based on the mixture that is recommended for Hollow Tile construction, consisting of one part Portland cement and three parts sand, to which 15 per cent of the volume of cement of hydrated lime or lime putty is added.

For the convenience of builders the table gives the quantities of lime both by measure and weight for lump lime and by weight for hydrated lime.

Barrel of Cement Specified to be 3.8 cu. ft.

Size of Tile	Thickness of Wall	Approximate Quantity of Mortar, Cu. Ft.	Mortar Materials Required				15% These Quantities For Ordering Lump Lime in Lbs.
			Cement Sacks	Sand, Cu. Ft.	15% Dry Hydrated Lime, Lbs.	15% Lump Lime Paste, Cu. Ft.	
4x 5x12	4"	19.66	6.28	19.65	38	.94	28
5x 4x12	5"	23.12	7.36	23.11	44	1.10	33
5x 8x12	5"	28.91	9.24	28.89	55	1.38	42
8x 5x12	8"	39.33	12.56	39.31	75	1.88	56
4x 5x12 } 8x 5x12 }	12"	59.02	18.88	59.02	113	2.83	85
4x12x12	4"	27.75	8.92	27.72	54	1.34	40
6x12x12	6"	41.66	13.32	41.66	80	1.99	60
8x12x12	8"	55.54	17.76	55.53	107	2.66	80
12x12x12	12"	83.33	26.64	83.32	160	3.99	120
					"A"	"B"	"C"

Use either one of Columns "A" and "B".

Column "A" is for dry hydrated lime purchased in bags.

Column "B" is for lump lime purchased by barrel or ton.

Column "C" gives the approximate quantity of lump required to make the amount of lime paste given in Column "B."

A barrel of lump lime containing approximately 3 cubic feet, weighing 185 pounds net, will produce about 6. to 6.5 cubic feet lime paste which, on account of water added will weigh about 70 pounds per cubic foot.

NOTE: In giving size of tile, the first number always indicates the thickness of wall, the second the width of tile, and the third the length to which it is cut.

A cubic foot of hydrated lime weighs 40 pounds.

A cubic foot of cement weighs 100 pounds.

Therefore at 15% there will be 6 pounds of hydrated lime to add to each cubic foot of cement.

*The Hollow Building Tile Association, Conway Building, Chicago*

## Cement Stucco

Mortar for exterior cement stucco or cement plastering should first be mixed dry. Spread the sand in a layer about 4 inches thick and dump the quantity of cement required on top of the sand and thoroughly mix the two materials dry until a uniform color is obtained; then add two-thirds of the quantity of water required and again mix, adding water as required to any dry spots, to obtain a uniform mass of proper consistency. A slight excess quantity of water is better than too little; but too much will make the mortar thin and more difficult to handle and retard the setting somewhat, especially in damp or cold weather.

When dry hydrated lime is used in cement mortar it should be added with the cement and mixed in dry before water is added, but if plastic lime putty is used it should be worked into the cement mortar after the water has been added.

Hollow Tile walls should be thoroughly cleaned from dust, dirt and lime mortar, and thoroughly moistened with water.

Cement plastering should be kept moist and protected from the sun, wind and frost until it has thoroughly hardened. If the surface is worked too much with a "float" or trowel, bringing a lot of cement to the surface, it is apt to develop hair cracks or

shrinkage cracks. To prevent this it is better to finish the surface with a felt polisher, if a reasonably smooth surface is desired, or with a wood, cork or carpet covered float for all ordinary purposes.

Hair cracks are due to a shrinkage of the surface as they do not extend into the mortar. They are more apt to occur in a wet mortar than in a dry one. They are also more noticeable on a smooth surface than on a rough one. As their depth is no thicker than a coarse hair, they can be removed very easily and the surface at the same time be given a very good appearance by acid wash.

Make a mixture of one part commercial muriatic acid and five parts water. Apply this to the surface with a stiff corn broom about three or four times, one application immediately after the other. Let this remain from five to ten minutes and then thoroughly scrub with clean water. If, after this treatment, the cracks still appear, repeat the operation, being careful to wash it off thoroughly, at the same time scrubbing it.

Two coat stucco work is all that is necessary on hollow tile walls. First coat a brown coat, and second coat a finish coat. This is a saving in both labor and material over other forms of construction.

MATERIALS FOR 100 SQUARE FEET OF CEMENT MORTAR FOR STUCCO

Thickness in Inches	1:1 1-2		1:2		1:3	
	Cement, Bbls.	Sand, Cu. yds.	Cement, Bbls.	Sand, Cu. yds.	Cement, Bbls.	Sand, Cu. yds.
1/2	.60	.14	.50	.15	.37	.17
3/4	.90	.20	.74	.22	.55	.25
1	1.20	.27	1.00	.29	.74	.33
1 1/2	1.79	.40	1.48	.44	1.10	.49

A three gallon (12 quart) bucket holds about 40 pounds cement and about 16 pounds (dry) hydrated lime, or about 28 to 30 pounds of lump lime paste.

If sand is measured by wheelbarrows, the quantity of an average barrow load for the particular type of barrow used should be measured by making a box to hold exactly 1 cubic foot.

*The Hollow Building Tile Association, Conway Building, Chicago*

## Laying Out the Building

In laying out Hollow Tile buildings that are to be finished with stucco, the stucco will take  $\frac{3}{4}$ " or more off each side of the rough opening and add this thickness at corners. Foundations should therefore be made 2" longer than the Hollow Tile wall and rough tile openings should be made 2" wider than the desired finished size of masonry openings, or back to back dimensions of the outside staff beads on window frames.

For residence buildings where 2" x 8" joist with double floors are to be used, where joists are not spaced close enough to permit the direct application of lath to underside of the joists, particularly when double floors are used, it is customary to cross-fur the ceiling with 1" x 2" strips laid either 12" or 16"

center to center, which with the lath and plastering, calls for an allowance of 2" for ceiling thickness or a total floor thickness of 11" to 12".

Thus approximately 12" is added for floor thickness to any given clear story heights, and the number of courses required is indicated by Fig. 935, page 17.

Story heights and courses for barns and hog houses would be figured as a basement or cellar story as indicated by Figures 929-E and 935, page 17, adding the depth required for the foundation wall below grade line.

Hollow Tile walls when foundations as well as the wall above grade is built of Hollow Tile, would be figured as follows:

For height of ceiling .....	8'-6" or 9'-0"
Add for depth of foundation (3'-0" below grade and 6" above) .....	3'-6"
Height of wall above footings .....	12'-0" or 12'-6"
For the 8'-6" ceiling height:	
For 5" tile this requires 26 courses .....	at $5\frac{1}{2}$ " or 11'-11"
For 12" tile this requires $11\frac{1}{2}$ courses .....	at $12\frac{1}{2}$ " or 12'-0"
For the 9" ceiling height:	
For 5" tile this requires 27 courses .....	at $5\frac{1}{2}$ " or 12'-4 $\frac{1}{2}$ "
For 12" tile this requires 12 courses .....	at $12\frac{1}{2}$ " or 12'-6"

Should the foundation for these buildings be built of concrete it is customary to extend the concrete wall about 6" or 8" above the floor line as shown by Fig. 935, page 17, which indicates the number of courses required for dairy barn walls.

For the standard load bearing tile that are made to be set with the cells vertical in the wall and which for any thickness of wall have a 12" x 12" face for 12" courses, it is quite customary to make the usual one-half inch allowance for the horizontal bed joints, but this is hardly sufficient in ordinary work and five-eighths inch is a safer average, giving some leeway in the leveling up of courses where there is a little variation in the size of the tile.

With this form of tile, the wall should be capped off at each story level with a

course of tile slabs both to give a proper bearing for the joist and for the tile forming the joist course in wall, and to close up the cells and cut off the circulation of air within the cells at each story level. For the tile slab course a full  $1\frac{1}{2}$ " should be allowed. Half length tile referred to as "half cuts," or brick if slabs are not available should be used where required to work out the story heights.

Fig. 930, page 17, indicates the number of courses required for various story heights where the 12" x 12" load bearing tile is used. Basement or cellar stories are figured in a similar manner.

When figuring height of upper stories the 2" thickness of roof plate must be allowed for.

Should the slab courses at story



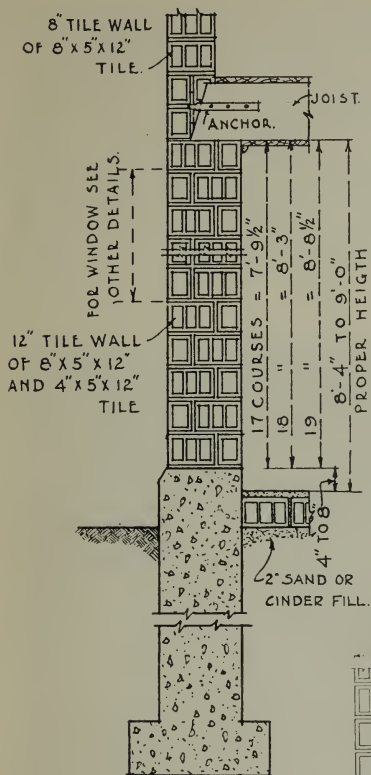


Fig. 935

Section through basement and foundation wall showing method of figuring story heights when building a 12" tile wall, using 8 x 5 x 12 tile and 4 x 5 x 12 tile, side construction.

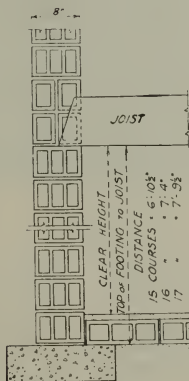


Fig. 929-E

Method of figuring basement heights so as to work in full blocks without cutting, using 8 x 5 x 12 tile, side construction.

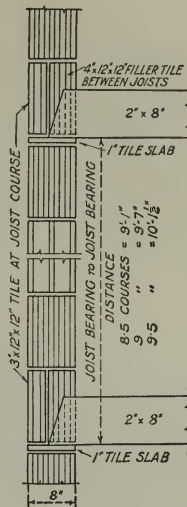


Fig. 930

Method of figuring story heights so as to use full blocks without cutting, using 8 x 12 x 12 tile, end construction.

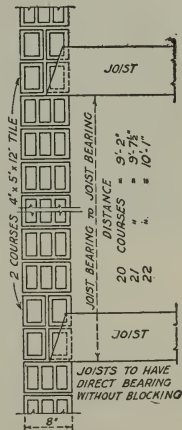


Fig. 929-D

Method of figuring story heights so as to use full blocks without cutting, using 8 x 5 x 12 tile, side construction.

levels not be used with the 12" x 12" face vertical cell tile, the method of figuring story heights is the same, except that allowance for slab course is omitted in figuring height of the tile and joints and the clear height for a given number of courses would therefore be about  $1\frac{1}{2}$ " less than the figures already given. In such cases, however, the joist should be given a full bearing by resting on a half brick. This raises the floor level about 2" in relation to the tile courses and

above grade, unless areaways are to be used around these windows.

A quick and accurate method of squaring each and all corners of a building when laying out wall lines is to drive stakes in the approximate location of the lines (batter boards being more serviceable than individual stakes) and using what is known as the 6-8-10 rule. By this rule we mean measuring from the exact intersection of the wall lines six feet in one direction and eight feet in the other direction



Fig. 967

allowance for this difference should also be made when clear story heights are figured.

In laying out the story height for cellars where a portion of the wall is to be above grade line, it is generally advisable to consider the relationship between normal grade line and top of footing and provide for cellar window frames of a size that will fit in with the courses of Hollow Tile and have sills

forming a triangle, two sides of which will be six feet and eight feet respectively, the hypotenuse of which should be ten feet.

The illustration shown above shows the workman in the foreground using a ten-foot rod as the hypotenuse of the triangle and the workman in the background adjusting the line either to the right or left to form a perfect square corner.

# $\frac{1}{2}$ " JOINTS.

③	1'-5"	
④	1'-10½"	
⑤	2'-4"	
⑥	2'-9½"	
⑦	3'-3"	
⑧	3'-8½"	
⑨	4'-2"	
⑩	4'-7½"	
⑪	5'-1"	
⑫	5'-6½"	
⑬	6'-0"	
⑭	6'-5½"	
⑮	6'-11"	
⑯	7'-4½"	
⑰	7'-10"	
⑱	8'-3½"	
⑲	8'-9"	
⑳	9'-2½"	

5" COURSE  
FOR 8"×5"×12" TILE.  
FOR 4"×5"×12" TILE.

Fig. 201-A

Table showing clear heights of openings in hollow tile walls for both side and end construction using 5" course.

# $\frac{1}{2}$ " JOINTS

①	1'-1"		①	1'-1 1/4"	
	① 1/2	1'-7"		① 1/2	1'-7 1/4"
②	2'-1 1/2"		②	2'-1 3/4"	
	② 1/2	2'-7 1/2"		② 1/2	2'-7 3/4"
③	3'-2"		③	3'-2 1/2"	
	③ 1/2	3'-8"		③ 1/2	3'-8 1/2"
④	4'-2 1/2"		④	4'-3"	
	④ 1/2	4'-8 1/2"		④ 1/2	4'-9"
⑤	5'-3"		⑤	5'-3 3/4"	
	⑤ 1/2	5'-9"		⑤ 1/2	5'-9 3/4"
⑥	6'-3 1/2"		⑥	6'-4 1/4"	
	⑥ 1/2	6'-9 1/2"		⑥ 1/2	6'-10 1/4"
⑦	7'-4"		⑦	7'-5"	
	⑦ 1/2	7'-10"		⑦ 1/2	7'-11"
⑧	8'-4 1/2"		⑧	8'-5 1/2"	
	⑧ 1/2	8'-10 1/2"		⑧ 1/2	8'-11 1/2"
⑨	9'-5"		⑨	9'-6 1/4"	

# $\frac{5}{8}$ " JOINTS.

12" COURSE  
FOR 12"×12" TILE OF  
ANY THICKNESS.

Fig. 201

Table showing clear heights of openings in hollow tile walls for both side and end construction using 12" course.

①	1'-0 3/8"	① 1/2	1'-0 5/8"
②	2'-0 3/4"	② 1/2	2'-7"
③	3'-1 1/6"	③ 1/2	3'-7 3/8"
④	4'-1 1/2"	④ 1/2	4'-7 3/4"
⑤	5'-1 7/8"	⑤ 1/2	5'-8 1/8"
⑥	6'-2 1/4"	⑥ 1/2	6'-8 1/2"
⑦	7'-2 5/8"	⑦ 1/2	7'-8 5/8"
⑧	8'-3"		

CENTER OF JOINT TO CENTER OF JOINT.

FOR WALL MEASUREMENT.

①	1'-0 3/4"	① 1/4	1'-6 3/4"
②	2'-1 1/8"	② 1/4	2'-7 1/8"
③	3'-1 1/2"	③ 1/4	3'-7 1/2"
④	4'-1 7/8"	④ 1/4	4'-7 7/8"
⑤	5'-2 1/4"	⑤ 1/4	5'-8 1/4"
⑥	6'-2 5/8"	⑥ 1/4	6'-8 5/8"
⑦	7'-3"	⑦ 1/4	7'-9"
⑧	8'-3 3/8"		

OUTSIDE OF JOINT TO OUTSIDE OF JOINT.

FOR WIDTH OF SINGLE OPENINGS.

②	2'-0 3/8"	① 1/2	1'-0 3/8"
③	3'-0 3/4"	② 1/2	2'-6 3/4"
④	4'-1 1/8"	③ 1/2	3'-7 1/8"
⑤	5'-1 1/2"	④ 1/2	4'-7 1/2"
⑥	6'-1 7/8"	⑤ 1/2	5'-7 7/8"
⑦	7'-2 1/4"	⑥ 1/2	6'-8 1/4"
⑧	8'-2 5/8"	⑦ 1/2	7'-8 5/8"

OUTSIDE OF PIER TO OUTSIDE OF PIER.

- BASED ON 3/8" JOINTS -

Fig. 203

Table showing widths for openings, piers, etc., for both side and end construction tile units.

1	2	3	4	5	6	7	8
1'-0 1/2"	2'-1"	3'-1 1/2"	4'-2"	5'-2 1/2"	6'-3"	7'-3 1/2"	8'-4"
1 1/2	2 1/2	3 1/2	4 1/2	5 1/2	6 1/2	7 1/2	
1'-0 3/4"	2'-1 1/4"	3'-7 3/4"	4'-8 1/4"	5'-8 3/4"	6'-9 1/4"	7'-9 3/4"	

- CENTER OF JOINT TO CENTER OF JOINT -

FOR WALL MEASUREMENTS.

1	2	3	4	5	6	7	8
1'-1"	2'-1 1/2"	3'-2"	4'-2 1/2"	5'-3"	6'-3 1/2"	7'-4"	8'-4 1/2"
1 1/2	2 1/2	3 1/2	4 1/2	5 1/2	6 1/2	7 1/2	
1'-7"	2'-7 1/2"	3'-8"	4'-8 1/2"	5'-9"	6'-9 1/2"	7'-10"	

OUTSIDE OF JOINT TO OUTSIDE OF JOINT

FOR WIDTH OF SINGLE OPENING.

1	2	3	4	5	6	7	8
2'-0 1/2"	3'-1"	4'-1 1/2"	5'-2"	6'-2 1/2"	7'-3"	8'-3 1/2"	
4 1/2	5 1/2	6 1/2	7 1/2				
1'-6 1/2"	2'-7"	3'-7 1/2"	4'-8"	5'-8 1/2"	6'-9"	7'-9 1/2"	

OUTSIDE OF PIER TO OUTSIDE OF PIER

- BASED ON 1/2" JOINTS. -

Fig. 200

Table showing widths for openings, piers, etc., for both side and end construction tile units.



## Bonding of Walls

The placing of openings for doors and windows in Hollow Tile walls and the details for bonding of walls at corners and around openings is naturally divided as follows:

First: Walls that are to be stuccoed or otherwise veneered and for which the breaking of joints between courses is required only for strength.

Second: Walls built entirely of Hollow Tile and for which the bond is required both for strength and appearance.

Generally a smooth or texture face tile is used for farm buildings, placing such buildings under the second classification. The ordinary rough structural tile is generally used for farm homes finished with stucco, but when this tile is used for barns, hog houses, and other buildings, it is usually left exposed.

There is no valid objection to the use of an ordinary scored building tile

product for any rough or unfinished structure, providing the tile is of the hard burned variety having a low absorption value and preferably has little or very shallow scoring on the faces.

Any bonding that gives suitable strength to the wall will meet the requirements of the first instance, while only a bond which combines with this in an even working out of the courses between openings, conforming to and aligning with the running bond throughout the balance of the wall will generally be considered satisfactory for exposed tile walls. For this latter reason a 6" running bond is usually preferred, having the joints between the tile in one course occur midway over a tile in the course below.

A very pleasing effect may often be obtained with the smaller tile units by using a 4" running bond, or breaking joints one-third the length of the tile, but on account of the bonding around windows, this is not generally recommended.

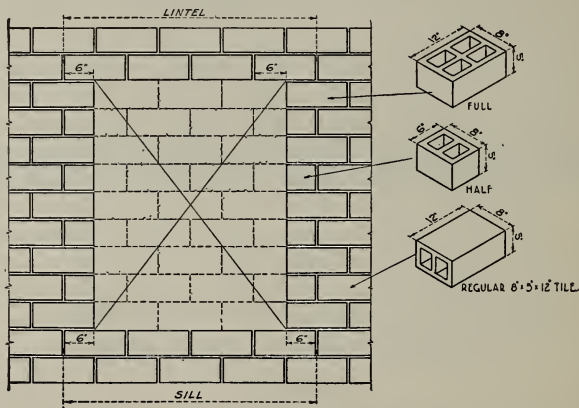


Fig. 117

*Method of allowing for closures and half-closures in connection with window and door openings to secure proper bonding in the wall.*

*The Hollow Building Tile Association, Conway Building, Chicago*

It will be noted from the accompanying details that the 6" bond has a decided advantage as it simplifies the working up to and bonding around openings. In any wall in which a finished jamb or reveal is required at openings, it is customary to use two shapes or sizes of tile, one the full 12" length and the other a short or half length to accommodate the running bond of wall courses. These are referred to as "full closures" and "half closures" where the end face gives a straight reveal, or "full jambs" and "half jambs" when the end face is rabbitted to form a recessed reveal, to provide for box window frames. Typical "jamb" and "closure" tile for an 8" thick wall built with 8 x 5 x 12 building tile are shown on page 7.

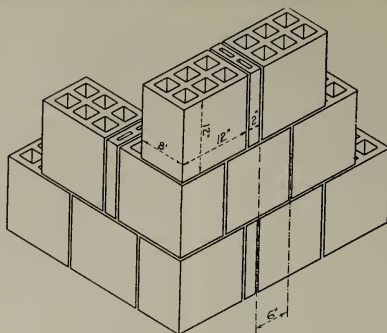
Naturally these shapes must be made to some standard length and as the full jambs and closures are made to conform with the standard length of the regular building tile, the short jambs and closures are accordingly made to half the length less one-fourth inch to allow for thickness of

vertical mortar joint. These sizes therefore call for a 6" running bond in the wall courses.

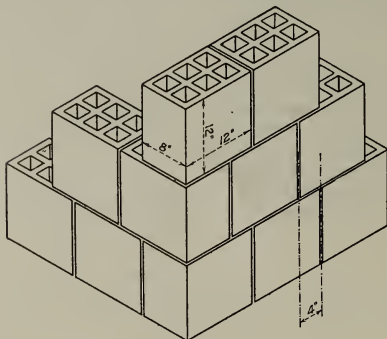
The advantage of this bond is explained by the diagram. Fig. 117, page 22, which shows the placing of an opening on walls that have the vertical joints between tile in alternate courses evenly staggered giving a 6" running bond. It will be noted that only two shapes are required to work up to opening, the full and half length tile, also that the sill and lintel will have an even projection and bearing each side of opening.

It is very seldom that the layout of openings and courses in any ordinary building cannot be arranged to conform to the even arrangement shown by Fig. 117, by adopting sizes for the door and window frames that will conform to multiples of full or full and half length tile with allowance for joints as already referred to. This gives steps of  $6\frac{1}{4}$ " in width of openings.

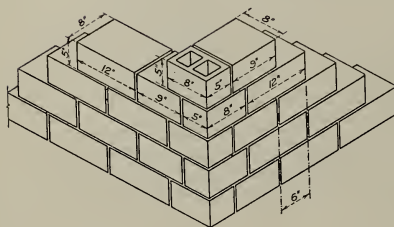
Details for the various corner bonds for 4, 5 and 8 inch walls are given on the following pages.



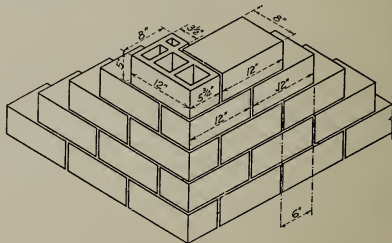
**Fig. 114**  
*End Construction 8" Wall*  
*This makes a uniform bond for exposed walls*



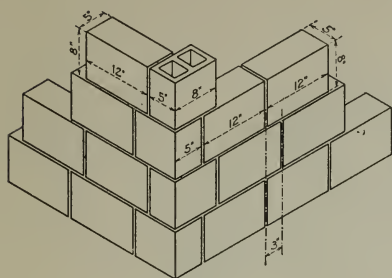
**Fig. 113**  
*End Construction 8" Wall*  
*The usual method of bonding corners when wall is to be stuccoed.*



**Fig. 101**  
*Corner bonds for 8" wall side construction.*

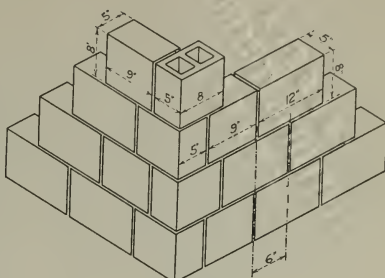


**Fig. 102**  
*Corner bonds for 8" wall side construction using special corner tile.*



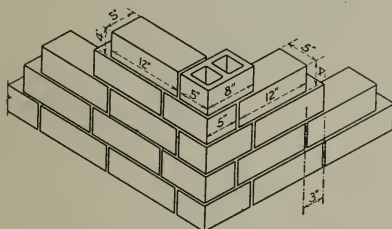
**Fig. 104**

*Usual method of bonding corners of 5" wall for side construction where wall is to be stuccoed.*



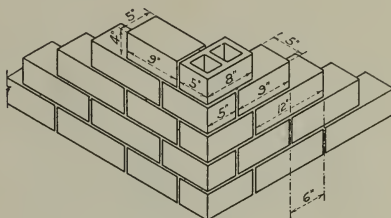
**Fig. 105**

*Use of 9" lengths to make even break bond where wall is to be exposed.*



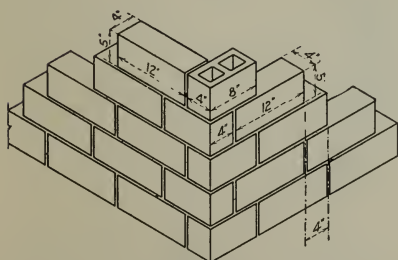
**Fig. 110**

*Usual method of bonding corners where wall is to be stuccoed.*



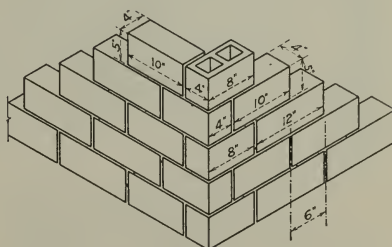
**Fig. 111**

*Use of 9" lengths to make even break bond where wall is to be exposed.*



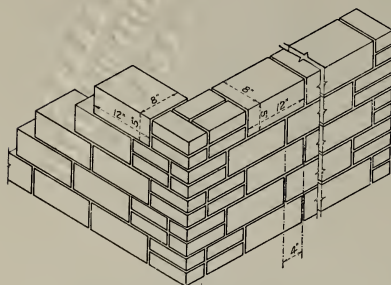
**Fig. 108**

*Usual method of bonding 4" wall at corners where wall is to be stuccoed.*



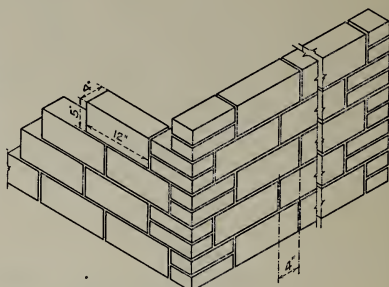
**Fig. 109**

*Use of 10" lengths to make even break bond where wall is to be exposed.*



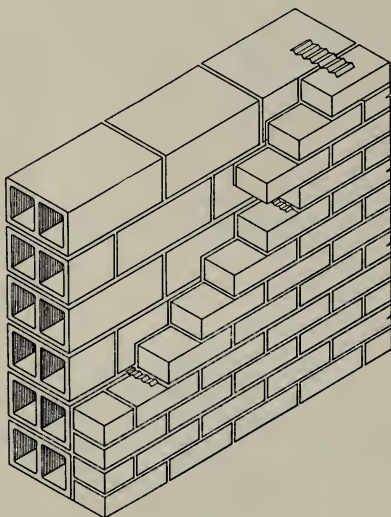
**Fig. 103**

*Common brick used for corners and openings on side construction 8" wall.*



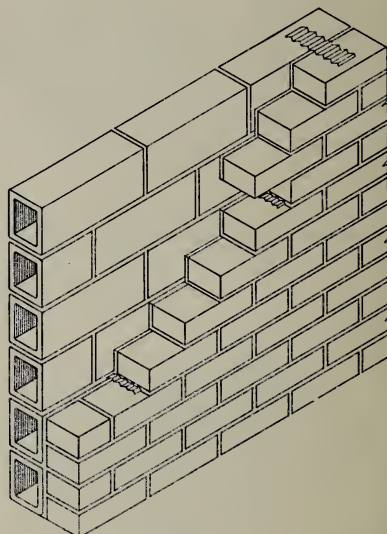
**Fig. 112**

*Common brick used for corners and openings on side construction 4" wall.*



**Fig. 952**

*8" tile wall side construction with brick facing.*

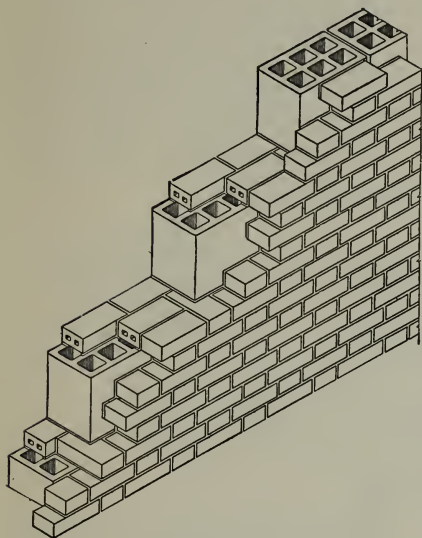


**Fig. 955**

*4" tile wall side construction with brick facing.*

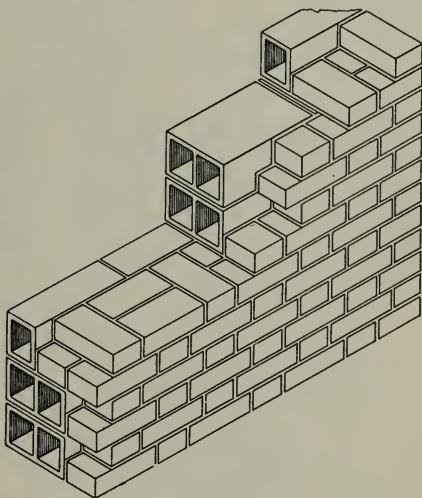
*Bonding with metal ties is only recommended for light structures.*





*Fig. 951*

*Shows an 8" tile wall with end construction, tile cut to bond with brick veneer, Flemish bond, with brick headers every 5th course.*



*Fig. 1026*

*Shows an 8" tile wall, side construction, with Flemish bond veneer. Full headers occur in every fifth and sixth course.*

## Hollow Tile Foundations

For small or moderate sized residences, garages, stores, and similar buildings, Hollow Tile foundation walls should be used. They have ample strength and are in every way satisfactory. This type of foundation wall gives a drier basement or cellar than the average wall of solid masonry of the same thickness. Hollow Tile founda-

tion walls have been found perfectly dry even in ground that was more or less saturated.

When the foundation walls are built in an occasionally saturated soil, the exterior face should be plastered with a water-proofed coat of cement mortar in order to insure the sealing up of any small openings in the mortar joints.

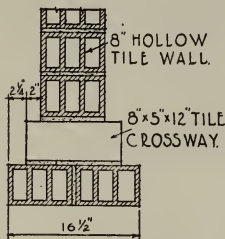


Fig. 915-A

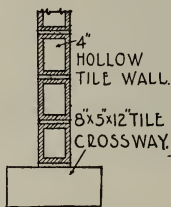


Fig. 915-B

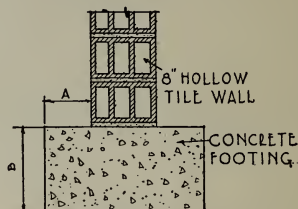


Fig. 915-C

## Footings

Footings under the walls of residence buildings, garages and other light structures may be built of Hollow Tile.

Suggested forms of construction for footings are shown by Figures 915-A, B and C.

For the hog house, poultry house, or small private garage, there is

nothing better, and for the moderate sized house this material is equally advantageous for footings.

Such footings afford natural drainage under the foundation, are easy to lay, can be built upon immediately, and have ample strength.

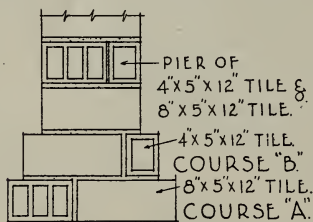
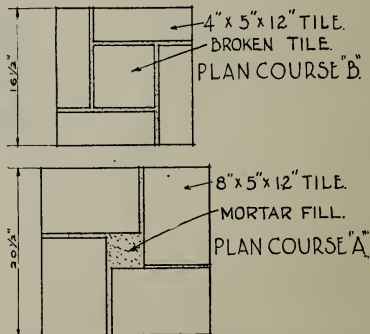


Fig. 919

Elevation of a pier using 4 x 5 x 12 tile and 8 x 5 x 12 tile.

Plan of course A and B with method of laying to secure a good bond.



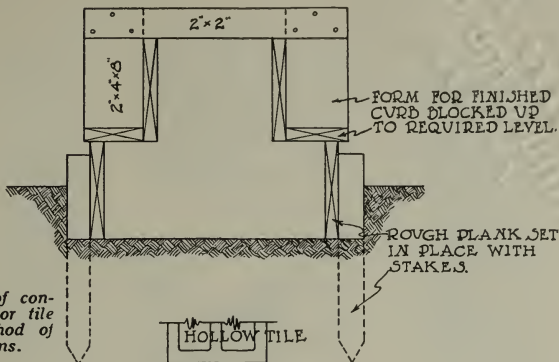
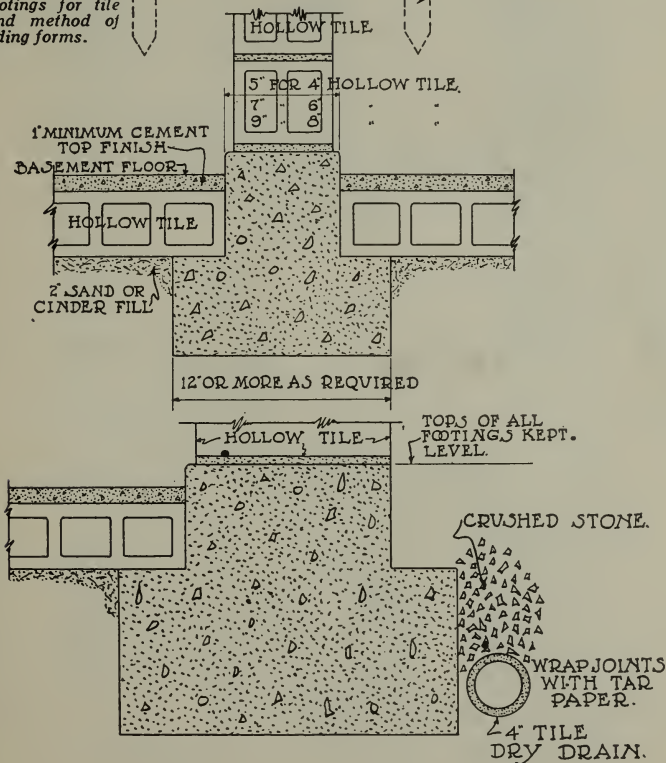
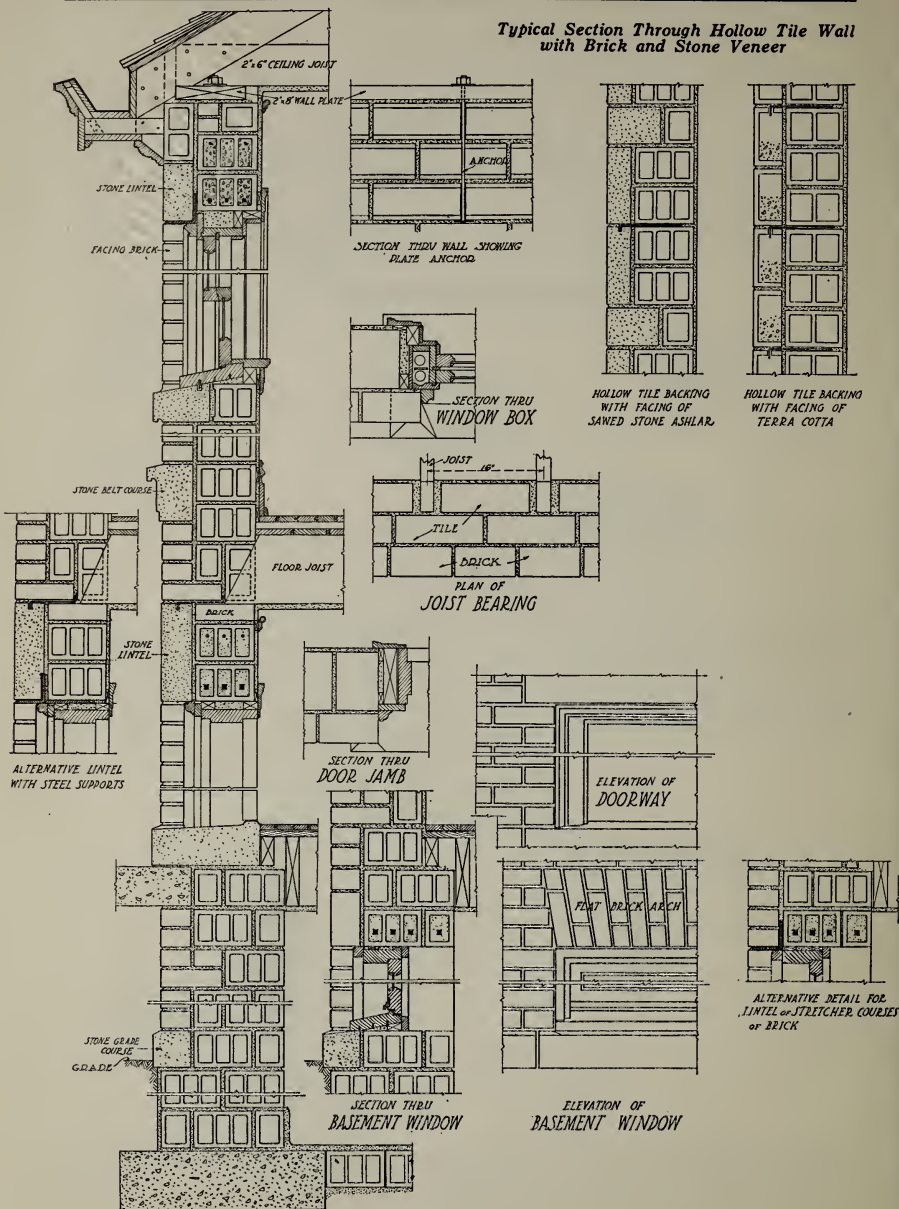


Fig. 985

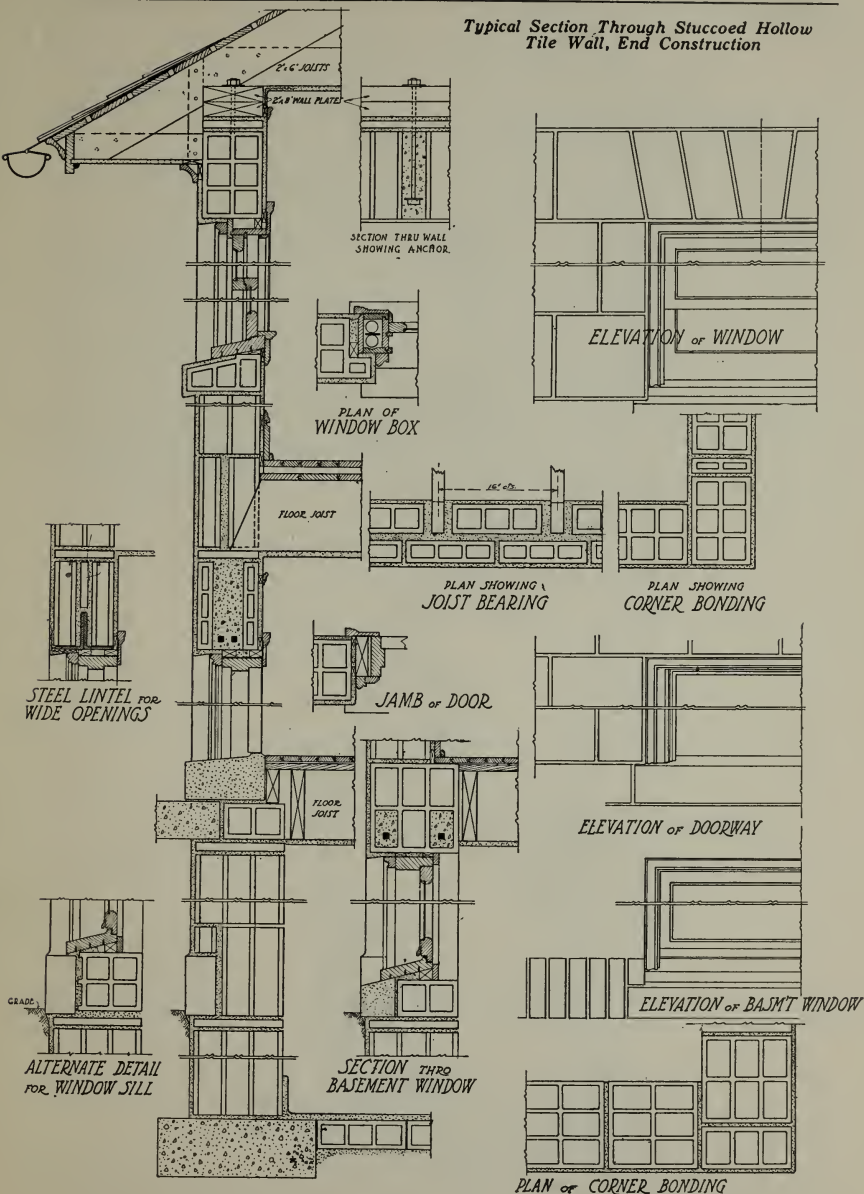
Typical detail of concrete footings for tile walls and method of building forms.



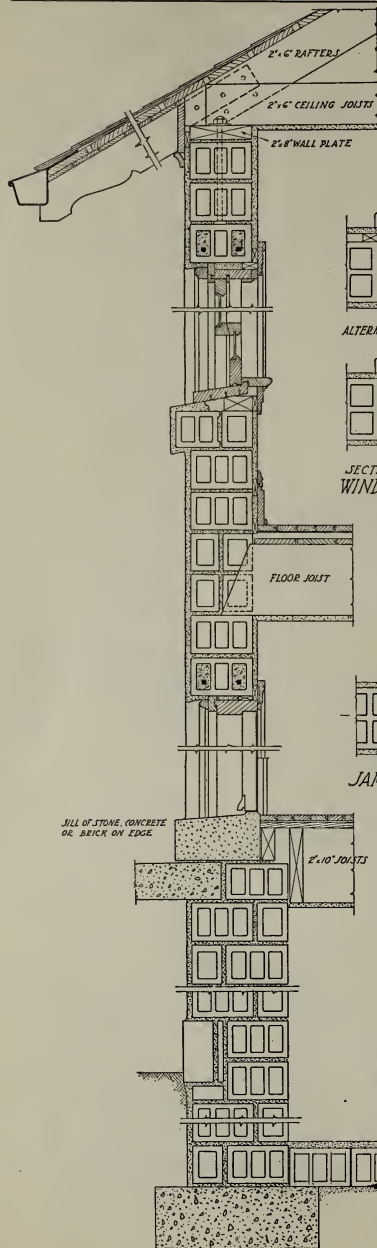
# *Typical Section Through Hollow Tile Wall with Brick and Stone Veneer*



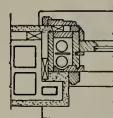
*Typical Section Through Stuccoed Hollow  
Tile Wall, End Construction*



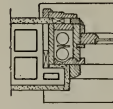




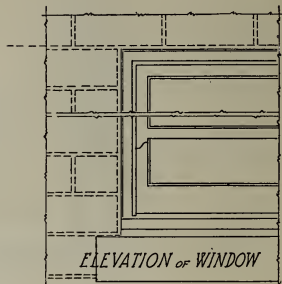
Typical Section Through Stuccoed Hollow Tile Wall, Side Construction



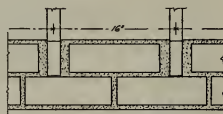
ALTERNATE DETAIL



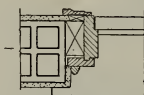
SECTION THRO WINDOW BOX



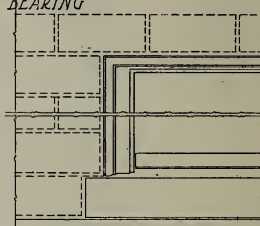
ELEVATION OF WINDOW



PLAN SHOWING JOIST BEARING



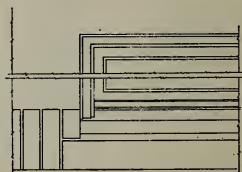
JAMB or DOOR



ELEVATION OF DOORWAY



SECTION THRO BASEMENT WINDOW



ELEVATION OF BASEMT WINDOW

## Wall Thickness

For the larger and more pretentious home a 12" foundation and first floor wall is generally used with an 8" wall for the second and attic stories.

The average thickness of wall for small or moderate size houses, when built of hollow tile is 8"; this is ample for all ordinary requirements.

The minimum thickness that should be used for a dairy barn in the lower part or cow barn is 12". Where the tile walls are carried up to enclose the hay mow, the upper story may be an 8" wall or even less where proper bracing is afforded. Plan for bracing of roof plate for plank frame roof construction on story and a half barns which has the Hollow Tile walls carried up several feet above the hay mow floor is shown by Fig. 916.

Small general purpose barns frequently have Hollow Tile walls 8" in thickness in the lower story but where dairy cattle are to be kept the 12" thickness is much better.

The better type of hog house, particularly in the cold northern section of the country should have 8" thick tile walls, the insulation of the double air cells being desirable, but are frequently built with 5" walls of the 8 x 5 x 12 tile set on edge.

Poultry houses, generally have walls 4" or 5" in thickness which is ample for this kind of building. Small garages, implement sheds and pump houses also may be built with walls, 4", 5" or 6" in thickness.

Dairy houses generally should have a wall 8" thick.

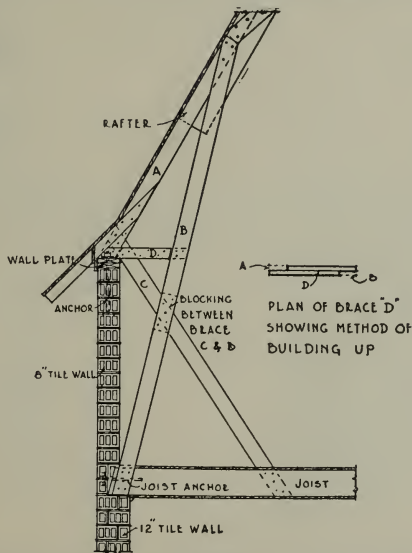
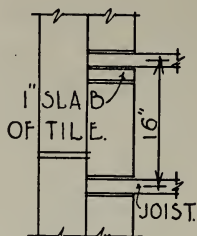
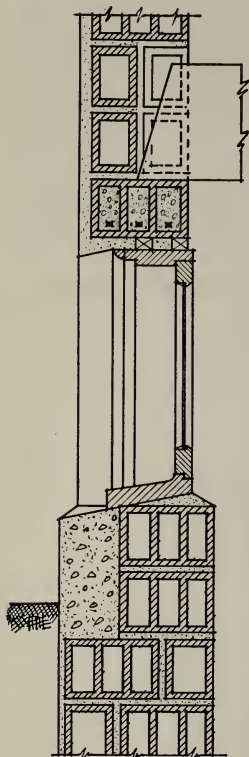


Fig. 916

*A practical method of tying rafters and floor joist together. These braces will relieve the upper portion of walls against outward thrust from the roof.*



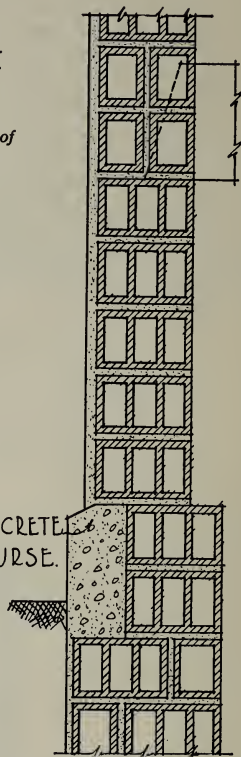
*Fig. 917-B*  
Plan showing method of  
filling in between joist.



SECTION OF BASEMENT  
WALL AT WINDOW.

*Fig. 917-A*  
Section through basement window  
showing method of building window sill.  
Side construction.

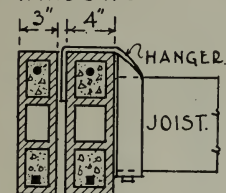
POURED CONCRETE  
GRADE COURSE.



SECTION OF BASEMENT  
WALL BETWEEN WINDOWS

*Fig. 917*  
Section through basement wall showing  
method of building water-table course.  
Side construction.

# LINTEL AT WINDOWS



## SECTION

Fig. 977-A  
Section through window or door  
lintels showing the use of joist  
hangers.

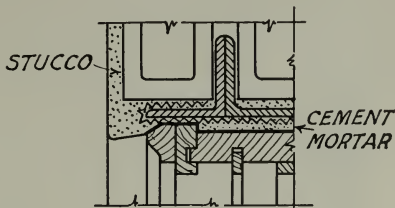
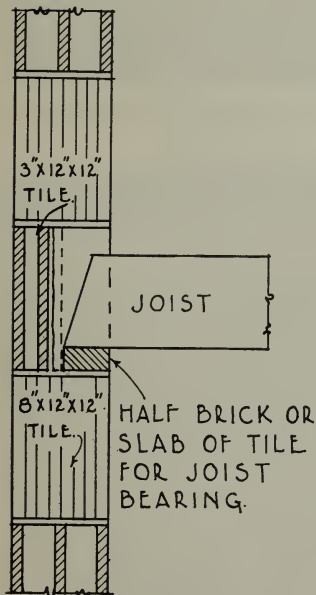


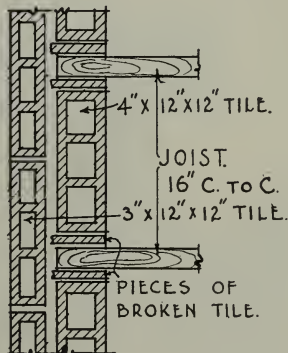
Fig. 978-A

Section through lintel showing steel support.



## SECTION

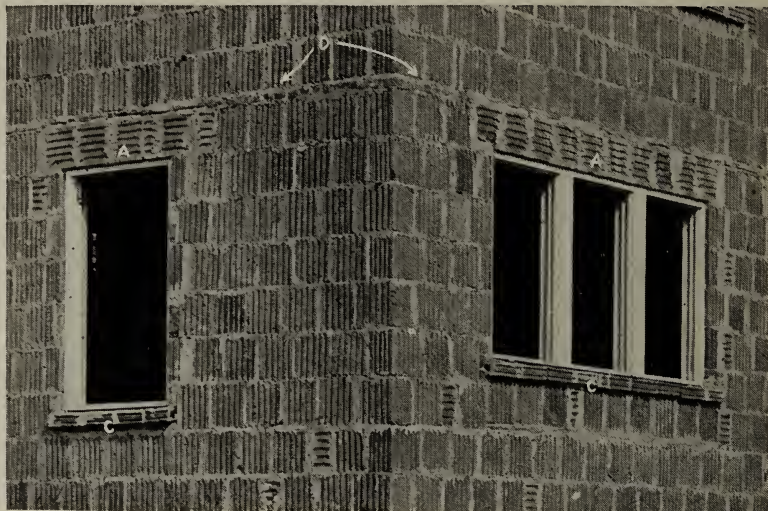
Fig. 977  
Section through wall showing joist bearing on 8"  
end construction tile wall without slab course.



## PLAN.

Fig. 977-B  
Plan through wall showing joist fillers or blocking  
between joist.





*Fig. 997-A*

*Detail at corner of Hollow Tile Wall showing (A) both ordinary and wide reinforced lintels over single and triple windows. Hollow Tile sills (C) and Tile slab course (D) forming joist bearing for the floor above in walls of end construction.*



*Fig. 996-A*

*Showing porch built of Hollow Tile on brick pier foundation.*

*The Hollow Building Tile Association, Conway Building, Chicago*



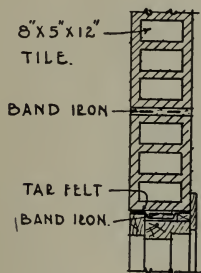
## Simple Tile Lintels

Hollow Tile walls for garages, poultry houses, in fact for any minor farm building or other simple structures in which the window openings are small and the walls frequently only 4", 5" or 6" in thickness, may be built without specially reinforced lintels, if the wall is reinforced by band iron bedded in the joints over window and door openings. This band iron reinforcement should be placed in two joints; in the one immediately over the wood frame, and in the joints above the first course of tile over the frame. Band iron should be well bedded in the cement mortar joints throughout its length and extend for at least 18" on

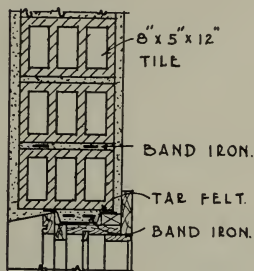
each side of the opening. Band iron reinforcing should be from No. 16 gauge up to  $\frac{1}{8}$ " in thickness and  $\frac{3}{4}$ " to 1" in width.

Several lines of heavy soft-steel wire (No. 4, 6 or 8 gauge) in each joint may be used in similar manner, or the regular woven wire reinforcement may be used.

Whenever cement mortar or concrete is placed directly on top of the wood frame as required in this form of lintel construction, a strip of tar paper should be placed over top of frame to prevent absorption of moisture from the mortar or concrete and the probable swelling or warping of the frame.

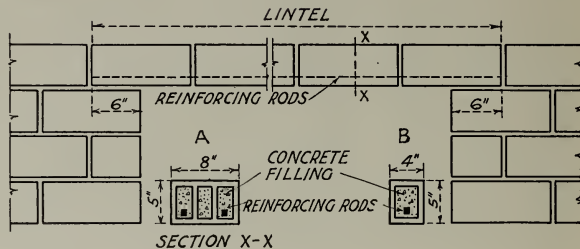


"A"  
8"X5"X12" TILE  
SET ON EDGE

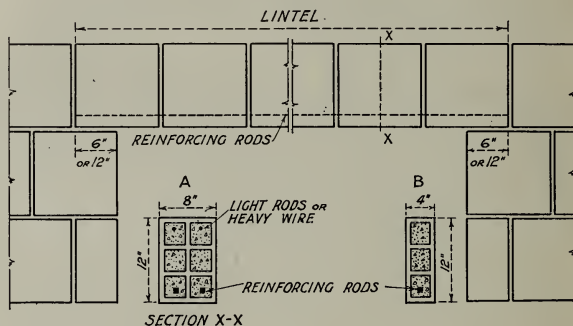


"B"  
8"X5"X12" TILE  
SET ON SIDE

**Fig. 910**  
Construction of a hollow tile lintel with the use of concrete and reinforcing steel on tile courses 5" high.  
"A" shows section through an 8" wall.  
"B" shows section through a 4" wall.



**Fig. 911**  
Method of reinforcing a hollow tile lintel for "A", an 8" wall, and "B", a 4" wall, using end or side construction with courses 12" high.



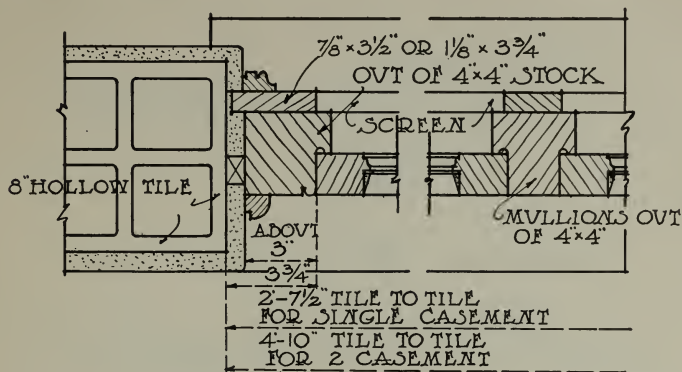
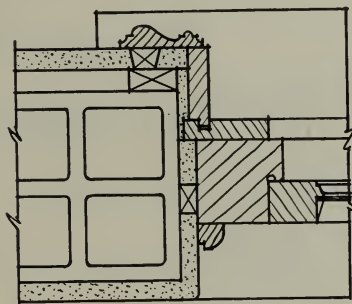


Fig. 988

Detail of outswinging casement sash in moulded plank frame.



ALTERNATE FOR FINISHED  
JAMB & TRIM.

Fig. 988-A

Alternate detail of outswinging casement sash for finished jamb and trim.

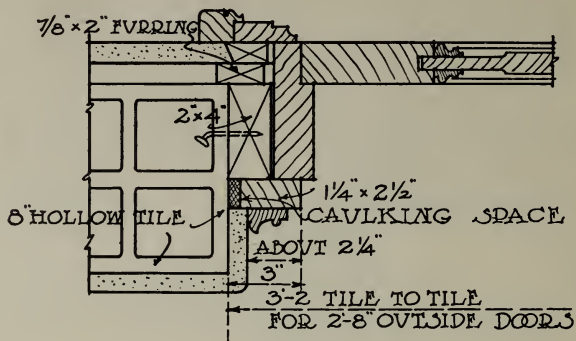


Fig. 991

Typical door frame detail with hollow tile walls, using rough pine bucks for all exterior doors.

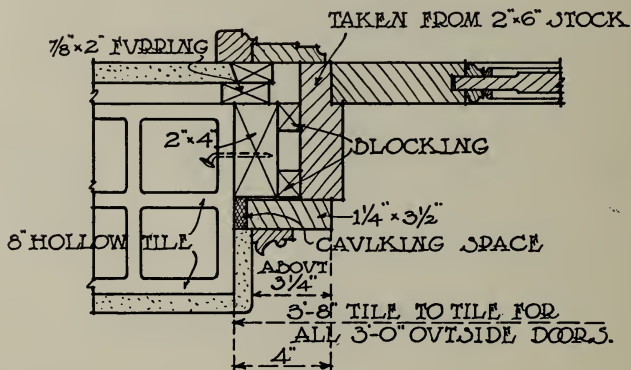


Fig. 991-A

Typical door frame detail with hollow tile walls showing method of obtaining larger door openings.

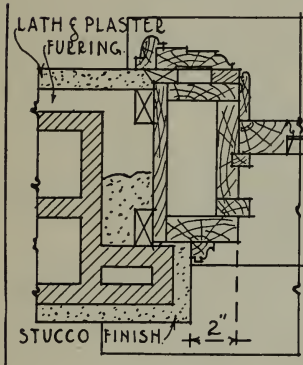


Fig. 990-C

Typical detail of double hung window and jamb tile with stucco finish returned back to frame and with inside trim.

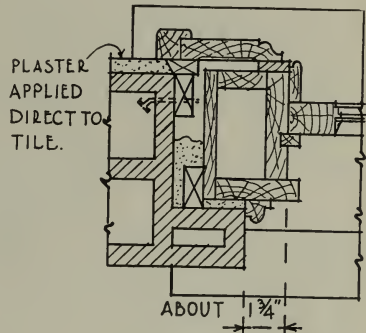


Fig. 990-D

Typical detail of double hung window and jamb tile without stucco finish and with inside trim.



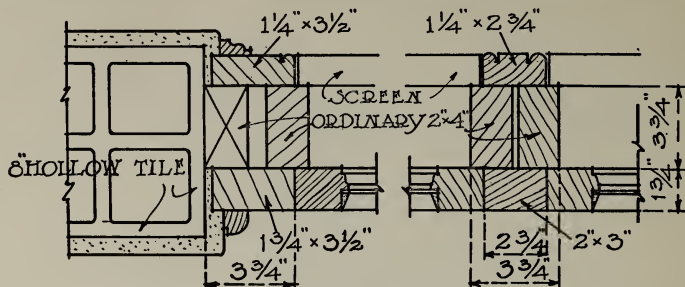


Fig. 989

Typical detail of outswinging casement sash in frames of 2' x 4' studs.

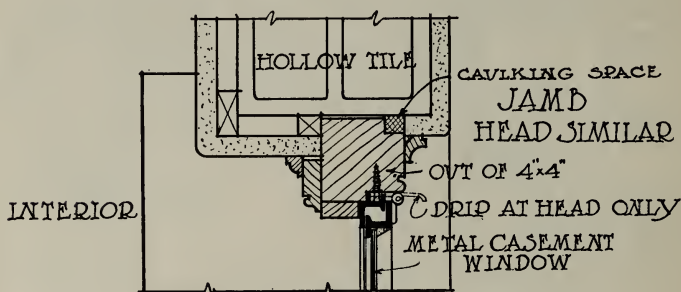


Fig. 992-A

Typical detail of jamb and head showing method of setting metal casement in wood frame for residence.

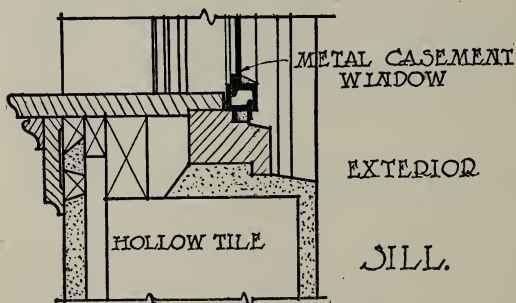


Fig. 992

Typical detail of sill showing method of setting metal casement in wood frame for residence.

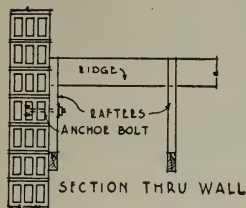
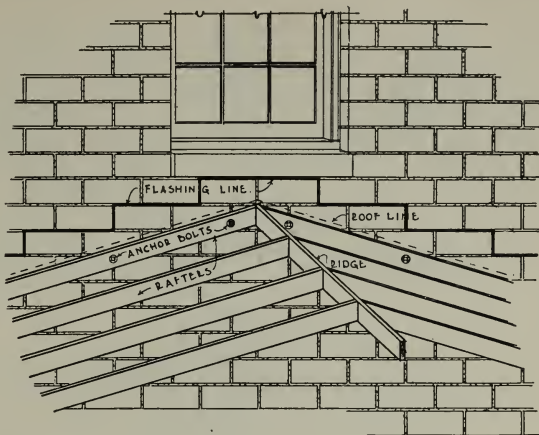


Fig. 941



## Method of Attaching Porch or Shed Roofs Against Hollow Tile Walls

Note carefully the method of attaching wood porches and similar additions to Hollow Building Tile walls. Bolts or anchors are built into the wall and when wall is completed nailing strip is fastened to face of the wall and the roof or other wood members spiked to these nailing pieces as shown by Figs. 940 and 941. This method is superior to the building of rafters or porch joist into the Hollow Tile walls. Ordinarily  $\frac{3}{4}$ ",  $\frac{5}{8}$ ", or  $\frac{1}{2}$ " bolts are used and are built in as the wall is erected. When the bolts are put in after wall is completed a toggle bolt is used if placed in the end joints of tile or an expansion bolt if placed in the side or bed joints, as shown by Figure 942, page 44.

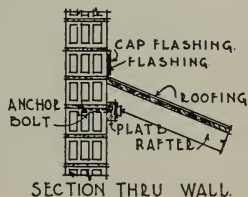
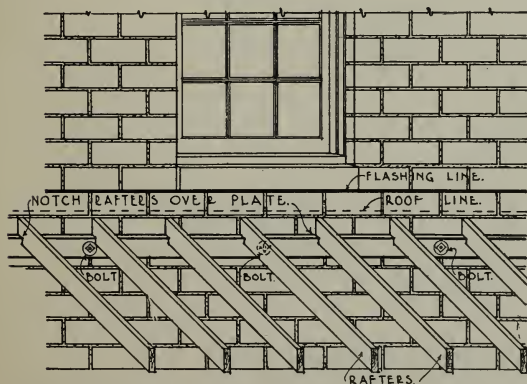


Fig. 940

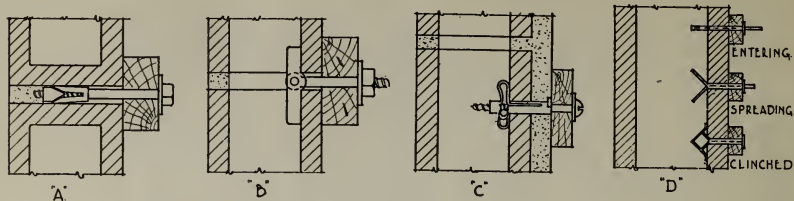
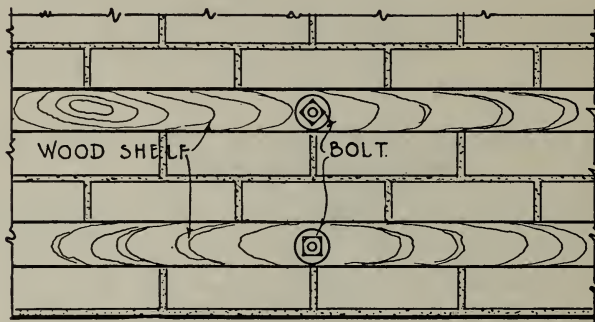


Fig. 942

- (a) Typical Expansion Bolt.  
(b) Typical Toggle Bolt.

- (c) Collapsible Steel Screw Socket.  
(d) Self-clinching Nail.



## ELEVATION.

Fig. 956

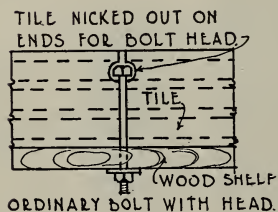


Fig. 956-A

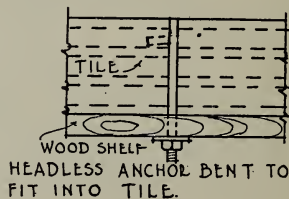


Fig. 956-B

*Elevation and plans for supporting shelves to hollow tile walls by means of headless anchors or ordinary machine bolts.*

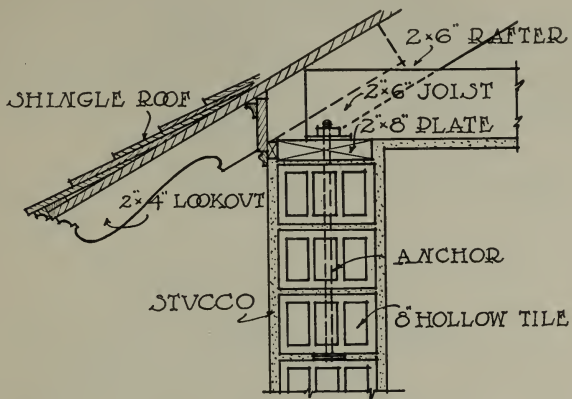


Fig. 961  
Typical side construction at eave.

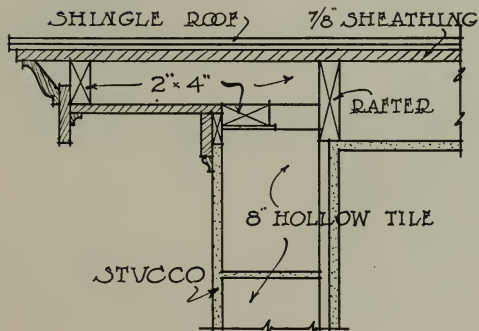
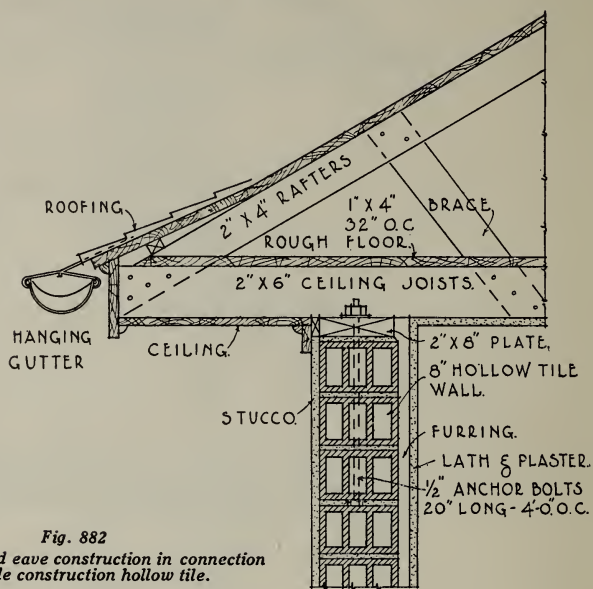


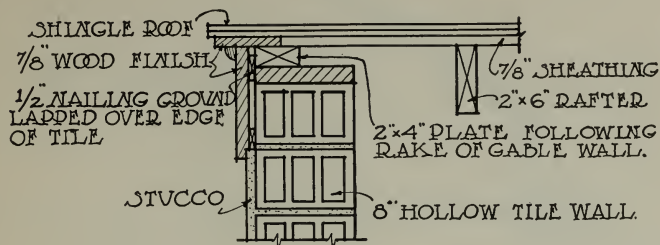
Fig. 961-A  
Typical end construction at gable.



**Fig. 882**

*Roof detail and eave construction in connection with side construction hollow tile.*

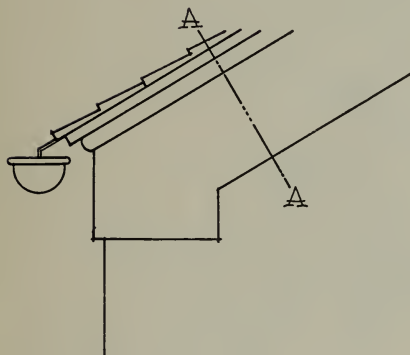




## SECTION A-A

Fig. 962

*Typical side construction with flush gable.*



SIMPLE METHOD OF  
 FINISHING ROOF AT  
 GABLE WALLS.

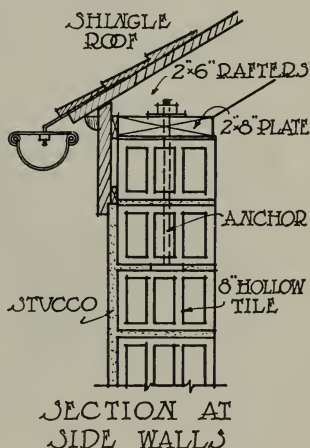
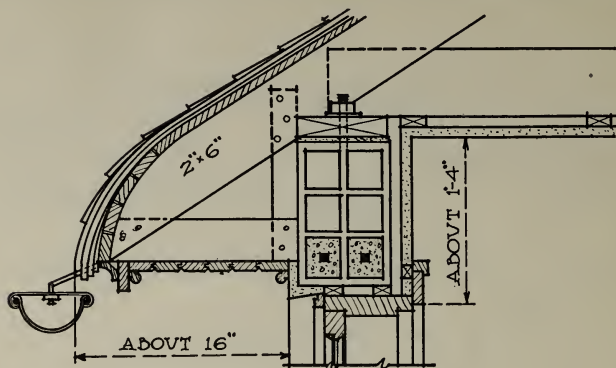


Fig. 962-A

*Typical side construction with flush eave.*



## SECTION AT EAVES

Fig. 964

Shingle thatched roof effect on hollow tile building.

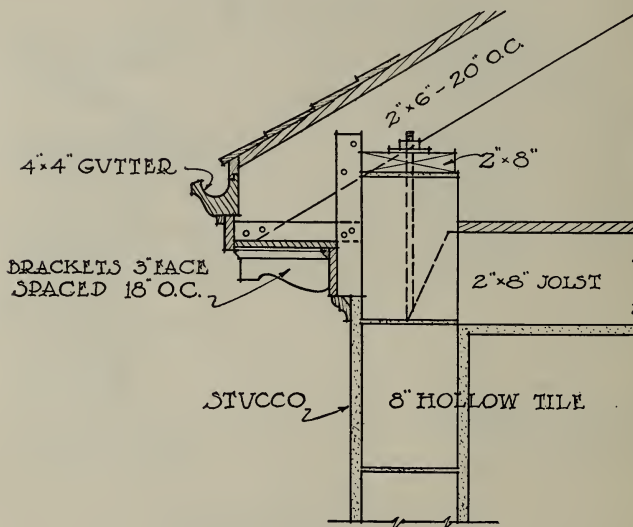


Fig. 963

Typical end construction with Colonial eave.



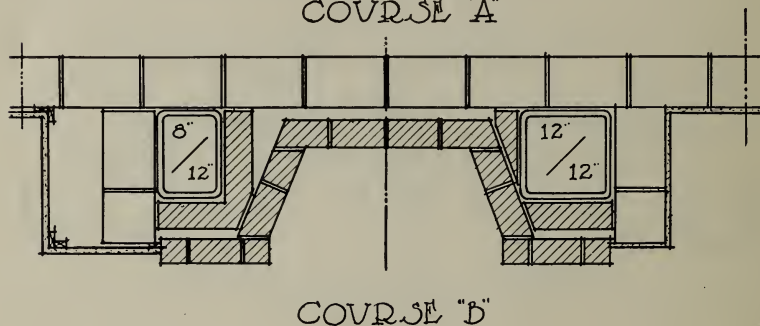
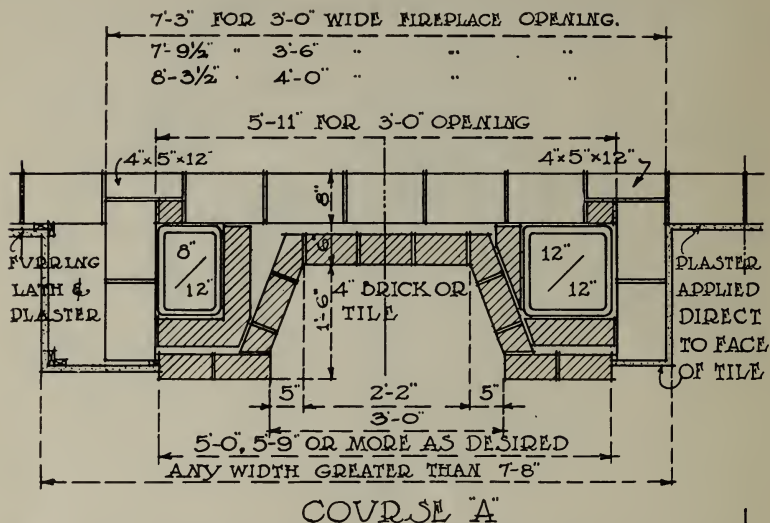


Fig. 971

Fireplace with side flues for furnace and for laundry and kitchen stoves set flush on outside in walls of 8 x 5 x 12 tile side construction.

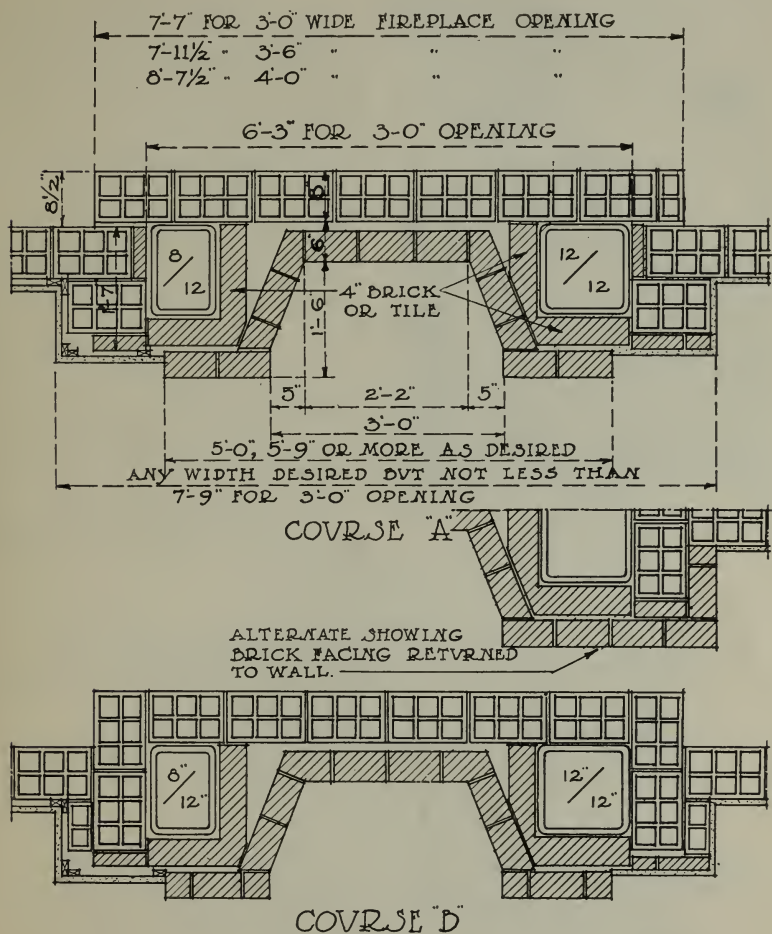


Fig. 976

Fireplace with side flues from furnace and for laundry and kitchen stove set midway in wall of 8 x 12 x 12 tile, end construction.





## Chimneys

Chimneys should always be built on a solid foundation resting on earth well below the frost line, at level of footing, whether they are interior or exterior chimneys. They should not be corbelled out as a projection from a wall and the top of chimney should be carried up to at least 3'-0" above flat roofs and 2'-0" above ridge of peak roofs.

Footing for chimneys should be at least 6" or 8" wider all around than the chimney foundation and for small chimneys should be 12" wider all around. All chimney flues should have a uniform 8" tile enclosing wall from the top of fireplaces (which may have greater thickness) to roof.

Only cement mortar should be used in the erection of chimneys, or a cement lime mortar in which the Portland cement used equals at least 50% of the cementing material.

All chimneys must be lined their entire height with fire clay flue lining, using care to break joints with the Hollow Tile.

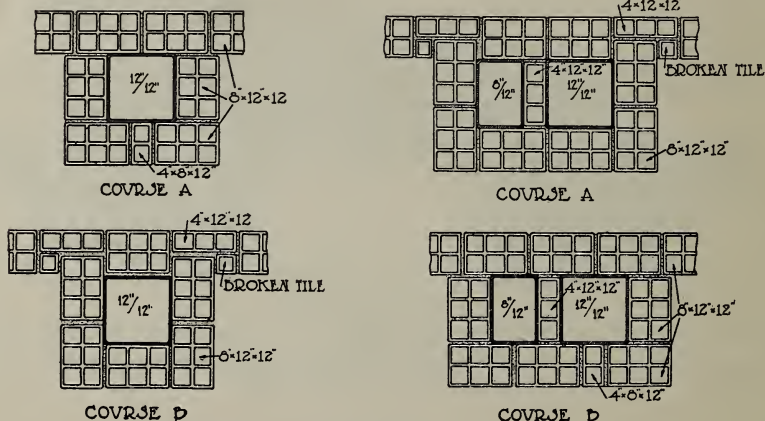


Fig. 1000

Detail of bonding wall in end construction for single and double flues.

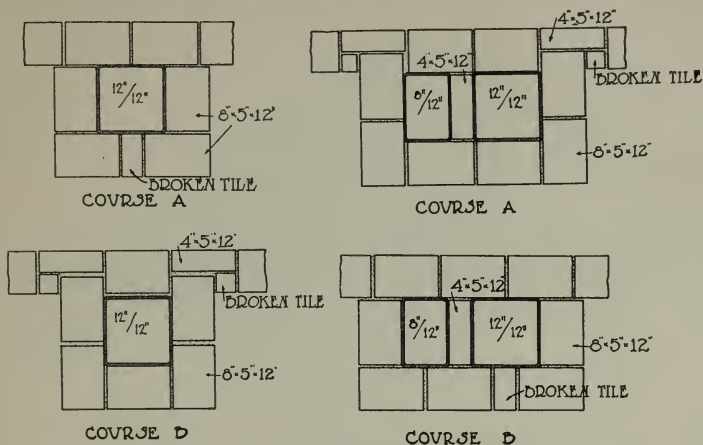


Fig. 999

Detail of bonding wall in side construction for single and double flues.



Fig. 995-A

Showing wall built of 8 x 5 x 12 Hollow Building Tile trimmed with brick belt courses, panels and window framing. Stucco will finish flush with the face of brick which projects approximately 1" from face of tile.

The Hollow Building Tile Association, Conway Building, Chicago

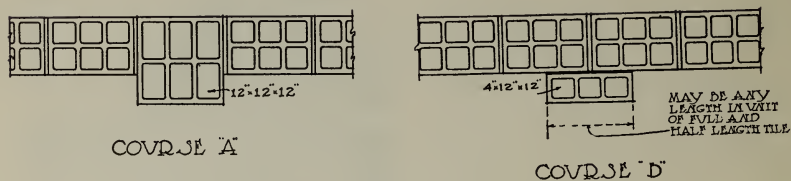


Fig. 982

*Method of bonding pilasters into walls in end construction.*

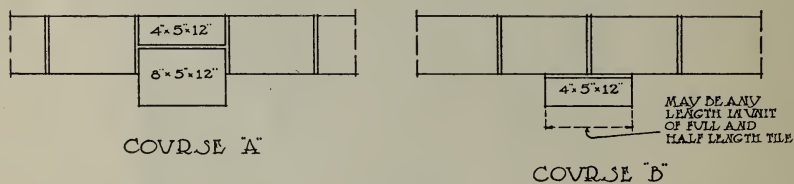
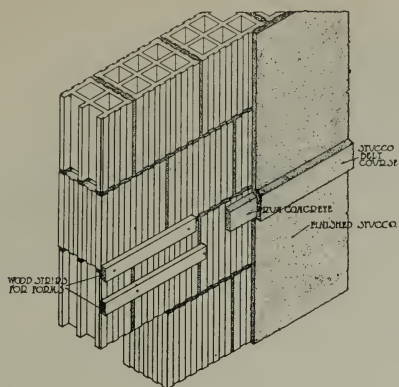


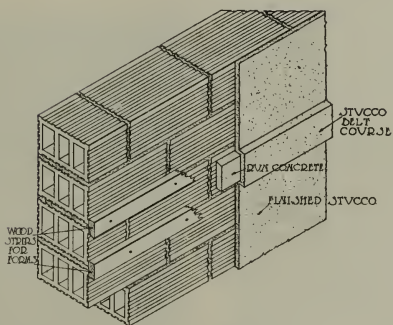
Fig. 983

*Method of bonding pilasters into walls using side construction. Care must be exercised to completely fill the exposed air cells in the pilaster projection beyond the face of the wall.*



**Fig. 995**

*Correct method of building belt course in end construction.*



**Fig. 997**

*Correct method of building belt course in side construction.*

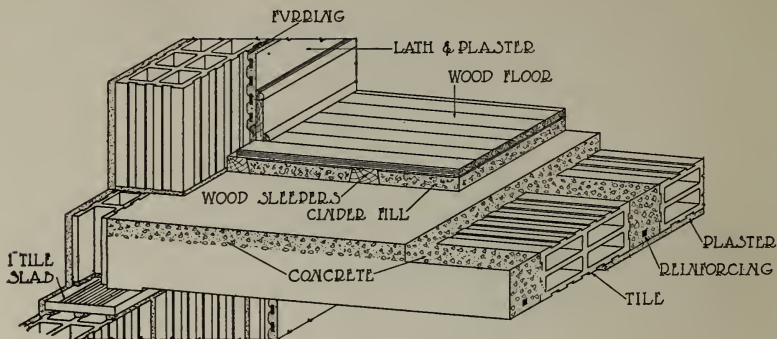


Fig. 953

## One Way Combination Floor

The size of reinforcing rods and thickness of floor depend upon the span and load carried. Complete information and tables on floor construction are given in the Association Floor Folder, Serial No. 229.

In the illustration above, a one way combination hollow tile floor with reinforced concrete beams is shown. This is a light, yet strong method of designing a floor slab. This form of construction, besides being economical in centering, offers the advantages of a flat ceiling without the application of lath and, in roof construction particularly, a freedom from condensation.

This type of floor is particularly adapted to all classes of buildings where medium or long span fireproof floors are required without intermediate or cross beams showing in the ceiling. Hollow tile in combination with concrete, reduces the dead load of the floor slab and provides an excellent plastering surface.

In the home, the one way combination hollow tile floor, in addition to its fire proofing quality, makes a dust proof barricade between the coal bin

and the living quarters above, also the assurance that in case of fire breaking out in the boiler room it cannot spread through the floor to the rooms above.



Fig. 994-A

Showing use of brick for 2nd story belt course and window sills in wall of Hollow Building Tile. Stucco will finish up under and down on to brick course.





*Fig. 994-B*

*Porch built of Hollow Tile on concrete pier foundation. Note the reinforced beam formed of Hollow Tile carrying the wall and floor construction. These beams are constructed same as lintels shown by Fig. 911, page 38.*

## The Necessity for Good Flashing

Wherever a roof over a porch or a lower gable roof comes in connection with hollow tile walls, flashing must be provided for.

Sheet lead makes a very desirable flashing although heavy gauged galvanized iron, if well taken care of, will answer the purpose.

This flashing should extend up the tile wall at least 6" or up to and into

the first horizontal joint and should then be brought down over the shingle roof or prepared roof at least 6", as shown in Fig. 940 and 941, page 43.

This will make a permanent water tight joint as long as the flashing lasts which, in the case of sheet lead, is indefinitely; but in the case of galvanized sheet iron care must be taken to keep the exposed surface well painted.

## Standard Window Openings

The following table of glass sizes can be used to the best advantage, so as to avoid excessive cutting of the hollow tile.

The size of the sash opening will be 4" wider and 6" higher than the glass sizes for double hung windows and 4" wider and 5" higher for casement windows.

### DOUBLE HUNG WINDOWS

Glass Size	Sash Opening	Exposed Tile Opening	Stuccoed Tile Opening
16x26	20x58	24x62	25½x63½
28x26	32x58	36x62	37½x63½
34x26	38x58	42x62	43½x63½
42x26	46x58	50x62	51½x63½

### CASEMENT WINDOWS

Glass Size	Sash Opening	Exposed Tile Opening	Stuccoed Tile Opening
20x24	24x29	28x33	29½x34½
20x42	24x47	28x51	29½x52½
20x56	24x61	28x65	29½x66½

### CELLAR WINDOWS

20x14	24x19	28x23	29½x24½
30x14	34x19	38x23	39½x24½
42x14	46x19	50x23	51½x24½

NOTE: 2" has been allowed between the back of the staff bead and the inside of the frame for exposed openings. An additional ¾" has been added all around for stuccoed openings.

## Window Sills

Outside window sills may be formed of sill tile or of a course of 3" or 4" thick Hollow Tile laid flat and finished in stucco or of brick on edge, or sawed stone, or cast concrete.

In walls of farm buildings that are built of 8 x 5 x 12 tile laid flat outside window sills are frequently omitted, the window frame being set sufficiently close to face of wall so that the wood

sill will project a little beyond face of tile.

In setting either brick, concrete or sawed stone sills on Hollow Tile walls that are to be stuccoed, an ample projection from the face of wall should be allowed so that they will have a projection of at least ¾", preferably a full inch beyond the face of finished wall.

## Caulking of Frames

A great many architects will prefer to have all window frames caulked in order to eliminate all chance of air leakage around window frames. In some instances caulking is more necessary for another purpose, that of preventing water finding its way through the wall around back of frames, during driving rainstorms.

Frequently in cases where dampness has been noted on the wall around windows the blame has been placed on the Hollow Tile, whereas it was due solely to poor workmanship in setting of window frames and ceased to exist or occur as soon as the frames were made tight.

Wood frames will shrink somewhat and caulking undoubtedly improves any building and is recommended in all northern sections of the country,

although not usually done in ordinary residence and commercial work.

If caulking is to be done properly, a groove for it should be provided, as it cannot be done properly in cracks that are so narrow that it can only be forced in with the edge of a knife.

Reference to the window frame details shown in the various cuts will indicate that provision for caulking has been made in every instance and it may be either included or omitted without changing any of these details.

The method of frame anchorage and very effective wind stop recommended makes caulking less necessary than when frames are set in the ordinary way.

When caulking is done with oakum, use the oakum dry. If soaked in oil or other substance containing grease, it will stain the stucco.

## Dairy Barn Windows

Note carefully the window and door frame details shown on pages 39 to 42, inclusive.

All frames for use in Hollow Tile walls should have strips nailed on the back in the manner shown.

This generally permits the use of standard stock frames and provides a wind-stop as well as an anchorage for the frames.

When the walls are to be finished with stucco, this stripping also serves to

block out the frames to properly allow for the stucco.

No other detail for plank frames such as are used in barns and other farm buildings possess all these advantages.

The best type of windows for dairy barns is a single sash window set flush with the inside of wall and hinged at the bottom, with galvanized iron, cheeks or wind shields mounted on the sides of frame (Fig. 954B.)



Fig. 954-D

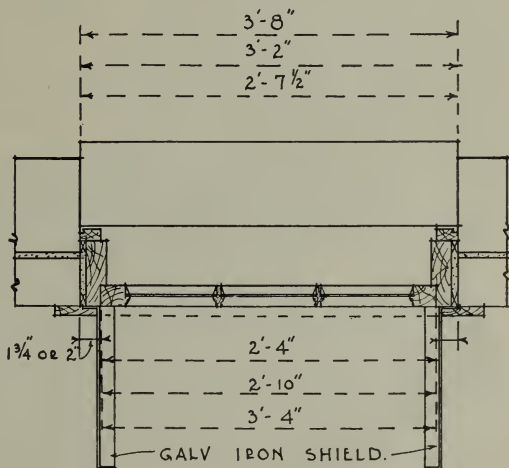


Fig. 954-B

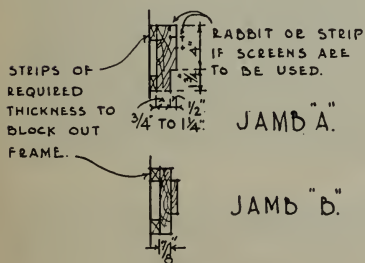


Fig. 954-C

The sill attached to frame should always be made of 2" plank and the outer sill may also be of plank or of brick on edge, as shown by alternate Section "A."

Window details shown by Fig. 954B are frequently used in Hollow Tile walls, but are not recommended for poultry houses, garages, and other such buildings having tile walls only 4" or 5" in thickness. This is a typical frame wall detail that is not particularly adapted to masonry walls.

In order to avoid cutting of the tile the best sizes of sash are as follows:

	Overall Size Sash Inches	Glass Area Sq. Ft.
9 Light 8" x 14" glass..	28 x 48	7.
12 Light 8" x 12" glass..	28 x 64	8.
9 Light 10" x 14" glass..	34 x 48	8.75
12 Light 10" x 12" glass..	34 x 64	10.
9 Light 12" x 14" glass..	40 x 48	10.5
or similar sizes of 1 or 2 light sash.		

All but the first size if arranged 1 window to each two cow stalls will give from 4 to 5 square feet of glass area per animal. This is a good rule to follow and gives the lighting area that is deemed necessary by dairy authorities. The sash in cold northern climates should be double glazed as shown. Frames are best made of plank as shown by Section "A" Fig. 954-B but may be of  $\frac{7}{8}$ " boards with strip nailed on as shown by Section "B."

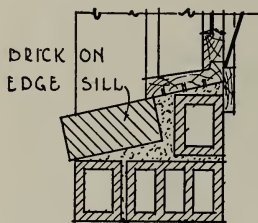


Fig. 954-A

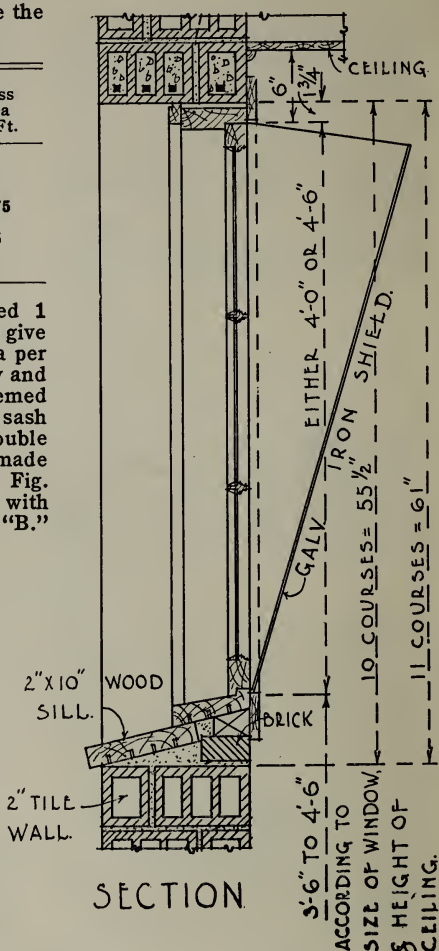


Fig. 954

Section through window showing type of window frame required and galvanized iron cheeks or wind shields mounted on the side of frame.



## Feeding Floors for Hog Houses

In making the plans for any hog house, a feeding floor with cement surface should be provided. This floor should be built in sections about 10 feet square and may consist of only two such sections at first, and be increased in area by adding sections as the herd increases.

Feeding floors should be located on the south or east side of the hog house or corn crib so as to be protected from cold winds, and the location should be well drained.

The floor should have a slope of about  $\frac{1}{4}$ " per foot in one direction away from the buildings.

The finishing surface should be done with a wood float, *not with a steel trowel*, so that a gritty surface is obtained that will prevent slipping.

A curb along the sides of feeding floor will prevent the waste of grain and is advisable. This will also prevent the hog from rooting underneath the edges of floor.

The best type of floor for the inside of a hog house is also built of Hollow Tile with cement finish.

Lay a bed of cinders or sand 4 to 8" in thickness which should be carefully levelled off, wetted and thoroughly tamped; spread over this a coat of cement mortar about  $\frac{1}{2}$ " thick and bed the tile which may be of any thickness, 4", 5", or 6". On this, lay the tile so as to break joints between the rows by using half length tile at ends in alternate rows. Tile should be laid as close as possible and any broken corners turned down so that

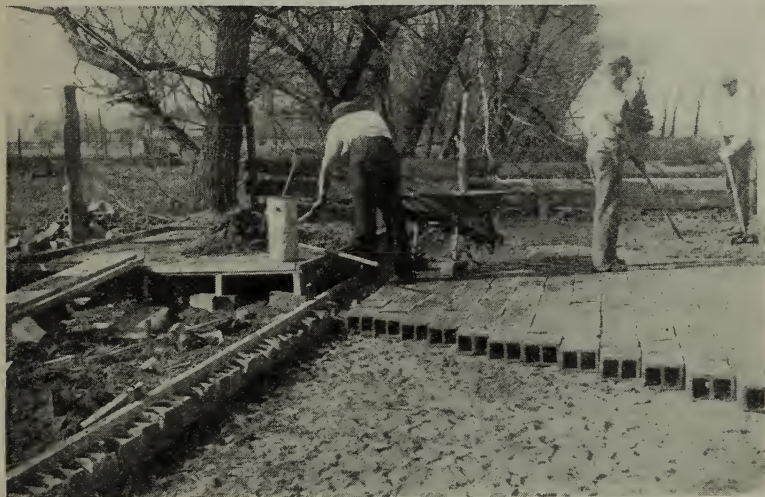


Fig. 968

*This illustration shows method of laying a hog house feeding floor. The tile are laid flat closely together upon a 4" sand mat, and a mixture of cement and sand spread to a thickness of at least 1" over the entire area. This forms a permanent and dry floor for hog feeding. Broken tile have been set in the ground against a plank to form the curb. The cement grout will fill up the tile curb making a permanent wall.*



upper surface will retain finish coat without much leakage of the mortar. The finish coat of Portland Cement is then spread over the tile with a straight edge and when it has settled thoroughly and the surplus water absorbed into the mixture should be finished with a wood float. The finish coat should be at

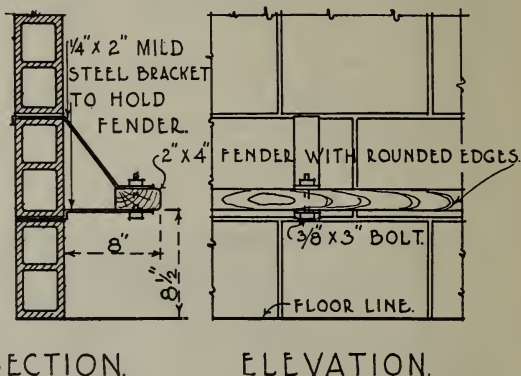
least 1 inch in thickness, but need not be over 1.5 inch in any case.

Sometimes this method of laying is varied by omitting the under coat of cement mortar and bedding the tile in a damp proofing course of asphalt or tar composition spread over the cinders.

## Hog House Fenders

Fenders are very important and should always be installed. They prevent the sow from crushing the little pigs against the wall when she lies down; they are simply shoved under the protecting rail and can easily get out and around to the front of the mother.

Detail for attaching Fender to hollow tile walls is shown by Fig. 957.



SECTION. ELEVATION.

Fig. 957  
Details showing method of anchoring fenders  
in hog pens to hollow tile walls.

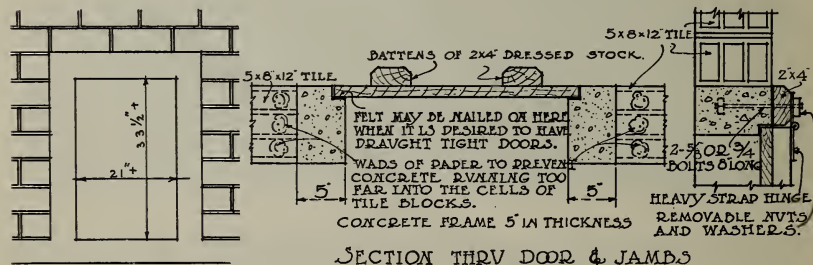


Fig. 958  
Hog House Doors.

Fig. 958-A  
Hog House Doors.

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## Specifications for Hollow Building Tile for use in Exterior Walls

Hollow Tile shall be uniform, straight, free from objectionable cracks and be manufactured in such a manner and burned to such a degree of hardness that it will have an average absorption of not over 12 per cent and develop an average ultimate crushing strength of not less than 700 pounds per square inch gross area, when designed to be laid in the wall with the cells horizontal and 1,200 pounds per square inch gross area when designed to be laid in the wall with the cells vertical.

**NOTE:—Exposed Wall Tile:—**Smooth face tile or other tile for use in exterior walls without stucco finish should be specified to have an absorption of not over 10 per cent.

**NOTE:—Foundation Tile:—**Tile for use in foundation walls in saturated soil or where constantly subjected to sub-surface water and the action of frost should be specified to have an absorption of not over 8 per cent.

## Hollow Tile Cellar Floors

Cellar floors built of hollow tile with a 1" top coat of a 1 to 3 mixture of cement and sand make an ideal form of floor construction. A good hard burned 4x12x12 or 5x8x12 tile may be used for this purpose. The tile are laid flatwise directly upon the leveled-off dirt floor. Second grade material may be used for this purpose, as small imperfections have no bearing on the quality of the floor. The function of the tile is to provide an air space underneath.

With a good hard burned tile it is an actual fact that the lower part of the tile can lay in a saturated soil or in water and yet the top coat will be comparatively dry.

Since any cellar is only as dry as its basement floor, it is evident that the hollow tile floor is the best way to obtain a dry basement.

By referring to page 61, which shows the construction of a hog house feeding floor, you can see how the Hollow Tile cellar floor should be laid.





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HOLLOW BUILDING TILE MANUAL FOR BUILDERS



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